

LONDON- WEST MIDLANDS ENVIRONMENTAL STATEMENT

Volume 5 | Technical Appendices

CFA23-26 | Balsall Common to Curzon Street
**Ecological baseline data: designated sites,
habitat surveys and flora (EC-001-004)**
Ecology

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Department
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High Speed Two (HS2) Limited,
Eland House,
Bressenden Place,
London SW1E 5DU

Details of how to obtain further copies are available from HS2 Ltd.

Telephone: 020 7944 4908

General email enquiries: HS2enquiries@hs2.org.uk

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Appendix EC-001-004

Environmental topic:	Ecology	EC
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Community forum areas:	West Midlands Met	254

Contents

Appendix EC-001-004	1
1 Introduction	9
2 Designated sites	10
2.1 Introduction	10
2.2 Methodology	10
2.3 Baseline	11
3 Protected and/or notable flora	17
3.1 Introduction	17
3.2 Methodology	17
3.3 Deviations, constraints and limitations	19
3.4 Baseline	20
4 Phase 1 Habitat Survey	33
4.1 Introduction	33
4.2 Methodology	33
4.3 Deviations, constraints and limitations	35
4.4 Baseline	35
5 National Vegetation Classification	47
5.1 Introduction	47
5.2 Methodology	47
5.3 Deviations, constraints and limitations	51
5.4 Baseline	53
6 River habitat survey	67
6.1 Introduction	67
6.2 Methodology	67
6.3 Deviations, constraints and limitations	68
6.4 Baseline	68
7 River corridor survey	125
7.1 Introduction	125

7.2	Methodology	125
7.3	Deviations, constraints and limitations	126
7.4	Baseline	127
8	Hedgerow survey	209
8.1	Introduction	209
8.2	Methodology	209
8.3	Deviations, constraints and limitations	209
8.4	Baseline	210
9	Ditch survey	239
9.1	Introduction	239
9.2	Methodology	239
9.3	Deviations, constraints and limitations	239
9.4	Baseline	240
10	Pond and canal survey	248
10.1	Introduction	248
10.2	Methodology	248
10.3	Deviations, constraints and limitations	248
10.4	Baseline	249
11	References	317

List of figures

Figure 1: River Corridor Survey Mapping Symbols	128
Figure 2: RCS hand drawn map for Bayleys Brook - Section 1 (040-RS1-148001)	132
Figure 3: RCS hand drawn map for Bayleys Brook - Section 1 (040-RS1-148001)	133
Figure 4: Photograph of Bayleys Brook - Section 1 (CFA23), photo reference 040-RS1-148001-P-140812-P1	134
Figure 5: Photograph of Bayleys Brook - Section 1 (CFA23), photo reference 040-RS1-148001-P-140812-P2	134
Figure 6: Photograph of Bayleys Brook - Section 1 (CFA23), photo reference 040-RS1-148001-P-140812-P3	135
Figure 7: RCS hand drawn map for Bayleys Brook - Section 2 (040-RS1-149001)	138
Figure 8: Photograph of Bayleys Brook - Section 2 (CFA23), photo reference 040-RS1-149001-P1-13/09/12-P1	139
Figure 9: Photograph of Bayleys Brook - Section 2 (CFA23), photo reference 040-RS1-149001-P1-13/09/12-P2	139
Figure 10: RCS hand drawn map for Bayleys Brook - Section 3 (040-RS-149002)	141
Figure 11: Photograph of Bayleys Brook - Section 3 (CFA23), photo reference 040-RS1-149002-P-050613-P1	142
Figure 12: RCS hand drawn map for River Blythe SSSI - Section 1 (040-RS-153001)	146
Figure 13: Photograph of River Blythe SSSI - Section 1 (CFA23), photo reference 040-RS1-153001-P-050912	147
Figure 14: RCS hand drawn map for River Blythe SSSI - Section2 (040-RS1-154001)	149

Figure 15: Photograph of River Blythe SSSI - Section 2 (CFA23), photo reference 040-RS1-154001-P-050912	150
Figure 16: RCS hand drawn map for Shadow Brook - Section 1 (040-RS1-155001)	153
Figure 17: Photograph of Shadow Brook - Section 1 (CFA23), photo reference 040-RS1-155001-P-060912-P1	154
Figure 18: RCS hand drawn map for Shadow Brook - Section 2 (040-RS1-155002)	156
Figure 19: Photograph of Shadow Brook - Section 2 (CFA23), photo reference 040-RS1-155002-P-060912-P1	157
Figure 20: RCS hand drawn map for River Blythe SSSI (040-RS1-155003)	160
Figure 21: Photograph of River Blythe SSSI (CFA24), photo reference 040-RS1-155003-P-100613-P1	161
Figure 22: Photograph of River Blythe SSSI (CFA24), photo reference 040-RS1-155003-P-100613-P2	161
Figure 23: RCS hand drawn map for Hollywell Brook - Section 1 (040-RS1-156001)	164
Figure 24: Photograph of Hollywell Brook - Section 1 (CFA24), photo reference 040-RS1-156001-p-070912-P1	165
Figure 25: Photograph of Hollywell Brook - Section 1 (CFA24), photo reference 040-RS1-156001-p-070912-P2	165
Figure 26: RCS hand drawn map for Hollywell Brook - Section 2 (040-RS1-156002)	167
Figure 27: Photograph of Hollywell Brook - Section 2 (CFA24), photo reference 040-RS1-156002-p-070912-P1	168
Figure 28: Photograph of Hollywell Brook - Section 2 (CFA24), photo reference 040-RS1-156002-p-070912-P2	168
Figure 29: RCS hand drawn map for Hollywell Brook - Section 3 (040-RS1-156003)	170
Figure 30: Photograph of Hollywell Brook - Section 3 (CFA24), photo reference 040-RS1-156001-P-100613-P1	171
Figure 31: Photograph of Hollywell Brook - Section 3 (CFA24), photo reference 040-RS1-156001-P-100613-P2	171
Figure 32: RCS hand drawn map for River Tame SLINC- Section 1 (040-RS1-166001)	175
Figure 33: RCS hand drawn map for River Tame SLINC- Section 1 (040-RS1-166001)	176
Figure 34: Photograph of River Tame SLINC - Section 1 (CFA25), photo reference 040-RS1-166001-P-101012	177
Figure 35: RCS hand drawn map for River Tame SLINC - Section 2 (040-RS1-166002)	180
Figure 36: RCS hand drawn map for River Tame SLINC- Section 2 (040-RS1-166002)	181
Figure 37: Photograph of River Tame SLINC - Section 2 (CFA25), photo reference 040-RS1-166002	182
Figure 38: RCS hand drawn map for River Tame SLINC- Section 3 (040-RS1-166003)	185
Figure 39: Photograph of River Tame SLINC - Section 3 (CFA25), photo reference 040-RS1-166003-P-260712	186
Figure 40: RCS hand drawn map for River Tame SLINC- Section 4 (040-RS1-166004)	189
Figure 41: Photograph of River Tame SLINC - Section 4 (CFA25), photo reference 040-RS1-166004-P-260712	190
Figure 42: RCS hand drawn map for Plants Brook (040-RS1-166005)	194
Figure 43: Photograph of Plants Brook (CFA25), photo reference 040-RS1-166005-P-110613-P1	195
Figure 44: Photograph of Plants Brook (CFA25), photo reference 040-RS1-166005-P-110613-P2	195

Figure 45: Photograph of Plants Brook (CFA25), photo reference 040-RS1-166005-P-110613-P3	196
Figure 46: Photograph of Plants Brook (CFA25), photo reference 040-RS1-166005-P-110613-P4	196
Figure 47: RCS hand drawn map for River Tame SLINC (040-RS1-170001)	199
Figure 48: Photograph of River Tame SLINC (CFA25), photo reference 040-RS1-170001-p-120613-P1	200
Figure 49: Photograph of River Tame SLINC (CFA25), photo reference 040-RS1-170001-p-120613-P2	200
Figure 50: RCS hand drawn map for River Rea - Section 1 (040-RS1-173001).	203
Figure 51: Photograph of River Rea - Section 1 (CFA26), photo reference 040-RS1-173001-P-130613-P1	204
Figure 52: Photograph of River Rea - Section 1 (CFA26), photo reference 040-RS1-173001-P-130613-P2	204
Figure 53: Photograph of River Rea - Section 1 (CFA26), photo reference 040-RS1-173001-P-130613-P3	205
Figure 54: RCS hand drawn map for River Rea - Section 2 (040-RS1-174001)	207
Figure 55: Photograph of River Rea - Section 2 (CFA26), photo reference 040-RS1-174001-P-130613-P1	208

List of tables

Table 1: Statutory designated sites within CFA23, CFA24, CFA25 and CFA26	12
Table 2: Non-statutory designated sites relevant to the assessment in CFA23, CFA24, CFA25 and CFA26	14
Table 3: Desk study records of protected and/or notable species records relevant to the assessment in CFA23, CFA24, CFA25 and CFA26	20
Table 4: Desk study records of non-native invasive plant species listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) in CFA23, CFA24, CFA25 and CFA26	25
Table 5: Records of protected and or notable species records relevant to the assessment obtained during field survey in CFA23, CFA24, CFA25 and CFA26	27
Table 6: Field survey records of non-native invasive plant species listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) in CFA23, CFA24, CFA25 and CFA26	28
Table 7: Areas of woodland (hectares) found within the land required for the construction of the Proposed Scheme	37
Table 8: Lengths of hedgerows (m) found within the land required for the construction of the Proposed Scheme	38
Table 9: Areas of grassland (hectares) found within the land required for the construction of the Proposed Scheme	41
Table 10: Areas of wetland (hectares) found within the land required for the construction of the Proposed Scheme	42
Table 11: Lengths of watercourse (km and hectares) found within the land required for the construction of the Proposed Scheme	43
Table 12: Number of water bodies found within the land required for the construction of the Proposed Scheme	44
Table 13: Areas of tall herb and fern (hectares) found within the land required for the construction of the Proposed Scheme	45

Table 14: Areas of ephemeral/short perennial vegetation (hectares) found within the land required for the construction of the Proposed Scheme	45
Table 15: Areas of arable field (hectares) found within the land required for the construction of the Proposed Scheme	46
Table 16: Summary of NVC surveys undertaken within CFA23, CFA24, CFA25 and CFA26	49
Table 17: Summary of locations in CFA23, CFA24, CFA25 and CFA26 where requirement for NVC survey identified but no access available for survey	51
Table 18: Summary of RHS survey locations	67
Table 19: Summary of locations where requirement for RHS identified but no access available for survey	68
Table 20: River Habitat Survey data sheet for Section 1, Bayleys Brook	69
Table 21: River Habitat Survey data sheet for Section 2, Bayleys Brook	72
Table 22: River Habitat Survey data sheet for Section 3, Bayleys Brook	75
Table 23: River Habitat Survey data sheet for Section 1, River Blythe SSSI	78
Table 24: River Habitat Survey data sheet for Section 2, River Blythe SSSI	81
Table 25: River Habitat Survey data sheet for Shadow Brook	84
Table 26: River Habitat Survey data sheet for River Blythe SSSI	87
Table 27: River Habitat Survey data sheet for Section 1, Hollywell Brook	91
Table 28: River Habitat Survey data sheet for Section 2, Hollywell Brook	94
Table 29: River Habitat Survey data sheet for Section 3, Hollywell Brook	97
Table 30: River Habitat Survey data sheet for Section 1, River Tame SLINC	101
Table 31: River Habitat Survey data sheet for Section 2, River Tame SLINC	104
Table 32: River Habitat Survey data sheet for Section 3, River Tame SLINC	107
Table 33: River Habitat Survey data sheet for Section 4, River Tame SLINC	110
Table 34: River Habitat Survey data sheet for Plants Brook	113
Table 35: River Habitat Survey data sheet for River Tame SLINC	116
Table 36: River Habitat Survey data sheet for Section 1, River Rea	119
Table 37: River Habitat Survey data sheet for Section 2, River Rea	122
Table 38: Summary of locations where RCS was undertaken in CFA23, CFA24, CFA25 and CFA26	125
Table 39: Summary of locations where requirement for RCS identified but no access available for survey	126
Table 40: RCS results for Bayleys Brook - Section 1 (CFA23)	130
Table 41: RCS results for Bayleys Brook - Section 2 (CFA23)	136
Table 42: RCS results for Bayleys Brook - Section 3 (CFA23)	140
Table 43: RCS results for River Blythe SSSI - Section 1 (CFA23)	144
Table 44: RCS results for River Blythe SSSI - Section 2 (CFA23)	148
Table 45: RCS results for Shadow Brook - Section 1 (CFA23)	152
Table 46: RCS results for Shadow Brook - Section 2 (CFA23)	155
Table 47: RCS results for River Blythe SSSI (CFA24)	159
Table 48: RCS results for Hollywell Brook - Section 1 (CFA24)	163
Table 49: RCS results for Hollywell Brook - Section 2 (CFA24)	166
Table 50: RCS results for Hollywell Brook - Section 3 (CFA24)	169
Table 51: RCS results for River Tame SLINC - Section 1 (CFA25)	173
Table 52: RCS results for River Tame SLINC - Section 2 (CFA25)	178
Table 54: RCS results for River Tame SLINC - Section 4 (CFA25)	187
Table 55: RCS results for Plants Brook (CFA25)	192

Table 56: RCS results for River Tame SLINC (CFA25)	198
Table 57: RCS results for River Rea - Section 1 (CFA26)	202
Table 58: RCS results for River Rea (CFA26)	206
Table 59: Summary of hedgerows where no access was available for survey in CFA23, CFA24, CFA25 and CFA26	209
Table 60: Summary of hedgerows qualifying as 'important hedgerows' under wildlife and landscape criteria	211
Table 61: Summary of locations where requirement for ditch survey was identified, but no access available for survey	239
Table 62: Summary of results from ditch surveys conducted in CFA23, CFA24, CFA25 and CFA26	241
Table 63: Summary of locations where requirement for pond survey was identified but no access available for survey	249
Table 64: Summary of rapid assessment methodology survey results	249
Table 65: Summary of results from PSYM surveys	251
Table 66: Survey Results for NPS on water body 040-PS3-148001	268
Table 67: Survey Results for NPS on water body 040-PS3-153001	276
Table 68: Survey Results for NPS on water body 040-PS3-153002	283
Table 69: Survey Results for NPS on water body 040-PS3-159001	290
Table 70: Survey Results for NPS on water body 040-PS3-165001	299
Table 71: Survey Results for NPS on water body 040-PS3-165002	307

1 Introduction

- 1.1.1 This document is an appendix which forms part of Volume 5 of the environmental statement (ES) for the Proposed Scheme. It details ecological baseline data collected for the following community forum areas (CFA):
- CFA23: Balsall Common and Hampton-in-Arden;
 - CFA24: Birmingham Interchange and Chelmsley Wood;
 - CFA25: Castle Bromwich and Bromford; and
 - CFA26: Washwood Heath to Curzon Street.
- 1.1.2 The document should be read in conjunction with Volume 2 (Community forum area reports), Volume 3 (Route wide effects) and Volume 4 (Off-route effects).

2 Designated sites

2.1 Introduction

- 2.1.1 This section of the appendix presents details of sites designated on the basis of their importance for nature conservation which fall within the scope of the ecological assessment for the section of the Proposed Scheme that will pass through CFA23, CFA24, CFA25 and CFA26.

2.2 Methodology

- 2.2.1 Data searches were initially undertaken to identify designated sites within the following extents:
- statutory designated sites within 10km of the route (i.e. a 10km buffer either side of the centreline of the route within this area); and
 - non-statutory designated sites within 5km of the route (i.e. a 5km buffer either side of the centreline of the route within this area).
- 2.2.2 Information on designated sites was obtained from the following data sources:
- Multi-Agency Geographical Information for the Countryside (MAGIC) website¹;
 - Natural England (NE)²;
 - Warwickshire Biological Records Centre³; and
 - EcoRecord⁴⁵.
- 2.2.3 All sites within the extents defined within the methodology for this area of the route were reviewed to identify those considered to be relevant to the assessment. Due to the large scale of the land required for the construction of the Proposed Scheme, only those sites meeting the following criteria are presented within the baseline section:
- all statutory designated sites within 500m of the land required for the construction of the Proposed Scheme;
 - any other statutory designated sites which are considered potentially subject to significant effects;
 - all non-statutory designated sites within or adjacent to the Proposed Scheme; and
 - any other non-statutory designated sites which are considered potentially

¹ Multi-Agency Geographical Information for the Countryside (MAGIC); <http://www.magic.gov.uk/>; Accessed: 08 October 2012

² Natural England (NE); *Sites of Special Scientific Interest (SSSI)*; <http://www.sssi.naturalengland.org.uk/Special/sssi/search.cfm>; Accessed: 09 July 2013

³ Warwickshire Biological Records Centre; *Warwickshire Museum*; <http://heritage.warwickshire.gov.uk/ecology/data-and-ecological-records/warwickshire-biological-records-centre/>; Accessed: April 2012

⁴ EcoRecord is the biological record centre for Birmingham and the Black Country (Dudley, Sandwell, Walsall & Wolverhampton)

⁵ EcoRecord; *The Ecological Database for Birmingham and the Black Country*; <http://www.ecorecord.org.uk/?q=home>; Accessed: April 2012

subject to significant effects.

- 2.2.4 Potential local wildlife sites and nature reserves are not considered within this section of the appendix, or in the designated sites sections of Volume 2 as they do not represent a formal designation. Where potential wildlife sites fall within the limits of survey identified within the Scope and Methodology Report (SMR) Addendum - Volume 5: Appendix CT-001-000/2, the habitats and species present have been reported as part of the habitats, protected and/or notable species baseline information contained within Volume 5 Appendices EC-002-004, EC-003-004, EC004-004 and EC-001-000.

2.3 **Baseline**

Statutory designated sites

- 2.3.1 Table 1 provides details of statutory designated sites considered relevant to the assessment, which can be viewed in conjunction with Map series EC -01 (Volume 5, Map Book Ecology).

Table 1: Statutory designated sites within CFA23, CFA24, CFA25 and CFA26

Site name and designation	Ordnance survey (OS) grid reference	Site description	Distance from land required for the construction of the Proposed Scheme ⁶ (m) and orientation	Relevant CFA number
Berkswell Marsh Site of Special Scientific Interest (SSSI)	SP 228 798	Berkswell Marsh is located in the Meriden gap between Birmingham and Coventry. It lies on alluvial deposits over Keuper Marl. The site is made up of an area of fen meadow bisected by a tributary of the River Blythe and two blocks of wet woodland. The marsh forms the largest-known example of fen meadow in the West Midlands county ⁷ . The fen meadow is largely dominated by lesser pond-sedge <i>Carex acutiformis</i> with jointed rush (<i>Juncus articulatus</i>) and soft rush (<i>J. effusus</i>) locally prominent.	10m, east	23
River Blythe SSSI	SP 212 912 to SP 109 729	A fine example of a lowland river on clay, and botanically very rich. Notable species include water-crowfoots (<i>Ranunculus spp.</i>), freshwater worms, caddis flies and pea-shell cockle (<i>Psidium moitessierianum</i>). The SSSI was notified for the aquatic plant and invertebrate communities that it supports ⁸ .	Within land required	23; 24
Coleshill & Bannerly Pools SSSI	SP 199 860	Two pools and an associated area known as 'The Bogs' which together form the only valley mire system in Warwickshire, surrounded by oak (<i>Quercus robur</i>) and birch woodland. Notable species found within the SSSI include greater tussock-sedge, bottle sedge (<i>Carex rostrata</i>), wavy hair-grass (<i>Deschampsia flexuosa</i>), heath bedstraw (<i>Galium saxatile</i>), heather (<i>Calluna vulgaris</i>), purple moor-grass (<i>Molinia caerulea</i>), marsh violet (<i>Viola palustris</i>), bluebell (<i>Hyacinthoides non-scripta</i>) and cross-leaved heath (<i>Erica tetralix</i>). The SSSI was notified for its valley mire, wet woodland and the species that these habitats support ⁹ .	Within land required	24

⁶ The phrase 'Within land required' represents an abbreviation of this term⁷ Natural England (2009) Citation for Berkswell Marsh SSSI⁸ Natural England (2010) Citation for River Blythe SSSI⁹ Natural England (2008) Citation for Coleshill & Bannerly Pools SSSI

- 2.3.2 The fen meadow of Berkswell Marsh SSSI was assessed in 2008 to be in an unfavourable condition because it was un-grazed and becoming rank¹⁰. The two blocks of wet woodland which form part of Berkswell Marsh SSSI were assessed in 2009 to be in favourable condition with good structure, plenty of dead wood and vigorous ground flora.
- 2.3.3 The River Blythe SSSI was assessed in 2010 to be in an unfavourable condition with no change since its last assessment, due to the presence of invasive freshwater species and water pollution from agriculture/run-off and discharge¹¹.
- 2.3.4 The condition of Coleshill & Bannerly Pools SSSI was assessed in 2008¹². The area of fen, marsh and swamp habitat to the west of the A446 Stonebridge Road was assessed to be in an unfavourable, but recovering, condition due to the birch invading this habitat. The area of woodland to the east of the A446 Stonebridge Road and immediately south of the M6 was assessed to be in an unfavourable, but recovering, condition with alder recovering well on the first tranche of rhododendron clearance, and sphagnum moss species reappearing on the second tranche of rhododendron clearance. The area of woodland just west of Packington Lane was assessed to be in a favourable condition.

Non-statutory designated sites

- 2.3.5 Table 2 provides details of non-statutory designated sites considered relevant to the assessment, which can be viewed in conjunction with Map series EC -01 (Volume 5, Map Book Ecology).

¹⁰ Natural England; *Condition of SSSI units*; <http://www.sssi.naturalengland.org.uk/special/sssi/reportAction.cfm?report=sdr13&category=S&reference=1006055>; Accessed: 09 August 2013

¹¹ Natural England; *Condition of SSSI units*; <http://www.sssi.naturalengland.org.uk/special/sssi/reportAction.cfm?report=sdr13&category=S&reference=1001772>; Accessed: 03 August 2013

¹² Natural England; *Condition of SSSI units*; <http://www.sssi.naturalengland.org.uk/special/sssi/reportAction.cfm?report=sdr13&category=S&reference=1001216>; Accessed: 03 August 2013

Appendix EC-001-004

Table 2: Non-statutory designated sites relevant to the assessment in CFA23, CFA24, CFA25 and CFA26

Site name and designation	OS grid reference	Site description	Distance from land required for the construction of the Proposed Scheme ¹³ (m) and orientation	Relevant CFA number
Berkswell Marsh Meadow Local Wildlife Site (LWS)	SP 225 801	A large field mainly comprising unimproved grassland with three locally rare vegetation communities: Yorkshire fog - soft rush pasture (National Vegetation Classification (NVC) habitat type MG10); Yorkshire fog-tussock grass grassland (NVC habitat type MG9); and lesser pond sedge-swamp (NVC habitat type S7). Notable species include sharp-flowered rush (<i>Juncus acutiflorus</i>), oval sedge (<i>Carex leporina</i>), square-stalked St. John's-wort (<i>Hypericum tetrapterum</i>), great burnet (<i>Sanguisorba officinalis</i>), bristle club-rush (<i>Isolepis setacea</i>) and devil's-bit scabious (<i>Succisa pratensis</i>) ¹⁴ .	Within land required	23
Patrick Farm Meadow LWS	SP 217 809	Wet, species-rich semi-improved and marshy grassland. Notable species include meadow fescue (<i>Festuca pratensis</i>), square-stalked St. John's-wort and remote sedge (<i>Carex remota</i>) ¹⁵ .	Within land required	23
Mouldings Green Farm, Hampton-in-Arden LWS	SP 214 817	A linear mosaic of habitats within the River Blythe SSSI floodplain comprising neglected, damp, semi-improved grassland, tall herbs, hedgerows, scrub, willow carr, dry ash woodland and a small pond. There was a small patch of NVC habitat type MG4 meadow foxtail (<i>Alopecurus pratensis</i>) - great burnet grassland, now a scarce habitat in Britain. Notable species include bluebell and the pond held a population of blue water-speedwell (<i>Veronica anagallis-aquatica</i>) ¹⁶ .	Within land required	23
Denbigh Spinney LWS	SP 204 843	A small area of semi-natural broad-leaved alder and birch woodland, best classified as an example of NVC habitat type W6e Alder (<i>Alnus glutinosa</i>) - common nettle (<i>Urtica dioica</i>) woodland downy birch (<i>Betula pubescens</i>) sub-community. The downy birch sub-community was the only example identified in the county. Notable plants included remote sedge and bluebell ¹⁷ .	Within land required	24
Coleshill Pool Wood LWS	SP 197 857	A 5ha area of broad-leaved semi-natural woodland which was historically part of Coleshill & Bannerly Pools SSSI prior to the construction of the M42. Notable species include grey willow (<i>Salix cinerea</i>), wavy hair-grass, heath bedstraw and bluebell ¹⁸ .	Within land required	24

¹³ The phrase 'Within land required' represents an abbreviation of this term

¹⁴ Warwickshire Biological Records Centre (2001) *Warwickshire Site of Importance for Nature Conservation: Wildlife Site Evaluation for Berkswell Marsh Meadow*

¹⁵ Warwickshire Biological Records Centre (2011) *Local Wildlife Sites Evaluation Form: Patrick Farm Meadow*

¹⁶ Warwickshire Biological Records Centre (2008) *Warwickshire Site of Importance for Nature Conservation: Wildlife Site Evaluation for Mouldings Green Farm*

¹⁷ Warwickshire Biological Records Centre (2001) *Warwickshire Site of Importance for Nature Conservation: Wildlife Site Evaluation for Denbigh Spinney*

¹⁸ Warwickshire Biological Records Centre (2000) *Warwickshire Site of Importance for Nature Conservation: Wildlife Site Evaluation for Coleshill Pool Wood*

Water Orton Sidings Site of Local Importance for Nature Conservation (SLINC)	SP 162 911	A small area of calcareous grassland. The SLINC is of importance for the calcareous grassland and diverse assemblage of plants and terrestrial invertebrates it supports ¹⁹ .	Immediately adjacent to the north	25
River Tame SLINC	SP 180 917 to SP029 926	A wide river which runs eastwards out of Birmingham. It serves as an important linear corridor facilitating species dispersal in and out of Birmingham. Notable plant species include water crowfoot (<i>Ranunculus fluitans</i>). The SLINC is of importance for the bullhead (<i>Cottio gobio</i>), birds and bats it supports ²⁰ .	Within land required	25; 26
Park Hall Site of Importance for Nature Conservation (SINC)	SP 155 908	Undisturbed escarpment woodland and species-rich and poor semi-improved grassland, with a mosaic of marshy grassland, swamp, ponds, ditches and scrub. Notable plant species include small-leaved lime (<i>Tilia cordata</i>), bluebell, wood millet (<i>Milium effusum</i>) and yellow archangel (<i>Lamium galeobdolon</i>). The SINC is of importance for the broad-leaved woodland, marshy grassland, swamp vegetation, water-bodies, plants, aquatic invertebrates, amphibians and birds it supports ²¹ . The SINC is also known as Park Hall nature reserve, and managed by the Wildlife Trust for Birmingham and the Black Country.	Within land required	25
Minworth Sewage Works SINC	SP 168 920	A 134ha site designated mainly due to the number of red list and schedule 1 bird species present ²² .	Within land required	25
Land off Bromford Drive SLINC	SP 125 896	Secondary broad-leaved woodland with areas of neutral grassland and scrub.	200m, south-east	25
River Rea and adjoining land SLINC	SP 107 896 to SP 039 791	A river which runs through Birmingham city centre, and joins the River Tame SLINC. The SLINC is of importance as a corridor which facilitates species dispersal between isolated areas of semi-natural habitat ²³ .	Within land required	26
Land at Warren Road SLINC	SP 101 888	A very steep embankment of mostly acid grassland, with small patches of scrub. Notable plant species include wavy hair-grass ²⁴ . The SLINC is designated for the acid grassland that it supports.	Within land required	26

¹⁹ EcoRecord (2004) *Review of Birmingham's Sites of Importance for Nature Conservation (SINCs) - Water Orton Sidings*

²⁰ EcoRecord (1990) *Birmingham Local Site Survey - River Tame*

²¹ EcoRecord (2007) *Review of Birmingham's Sites of Importance for Nature Conservation (SINCs) - Park Hall SINC*

²² Severn Trent Water; *Integrating Biodiversity on a Capital Scheme*; [www.stwater.co.uk/upload/pdf/Biodiversity_at_Minworth .pdf](http://www.stwater.co.uk/upload/pdf/Biodiversity_at_Minworth.pdf); Accessed: 15 October 2013

²³ EcoRecord (1990) *Birmingham Local Site Survey - River Rea and adjoining land*

²⁴ EcoRecord (1989) *Birmingham Local Site Survey - Land at Warren Road*

Appendix EC-001-004

New Saltley Pool SLINC	SP 096 892	A mosaic of habitats consisting of two pools, neutral grassland and wet grassland which supports a variety of flora ²⁵ .	20m, west	26
Grand Union Canal SLINC	SP 097 900 to SP 131 831	A canal which runs through Birmingham city centre, and supports a variety of wetland plants and birds. The SLINC is of importance as a corridor which facilitates species dispersal between isolated areas of semi-natural habitat ²⁶ .	Within land required	26
Digbeth Branch Canal SLINC	SP 077 880 to SP 078 868	A canal which runs through the city centre of Birmingham, and supports a variety of wetland plants and birds. The SLINC is of importance as a corridor which facilitates species dispersal between isolated areas of semi-natural habitat ²⁷ .	Within land required	26

²⁵ EcoRecord (1995) Birmingham Management Plan New Saltley Pool

²⁶ EcoRecord (1990) Birmingham Local Site Survey - Grand Union Canal

²⁷ EcoRecord (1990) Birmingham Local Site Survey - Digbeth Branch Canal

3 Protected and/or notable flora

3.1 Introduction

- 3.1.1 This section of the appendix presents details of baseline information relating to protected and/or notable flora (including veteran trees and non-native invasive plants) for the section of the Proposed Scheme that will pass through CFA23, CFA24, CFA25 and CFA26.

3.2 Methodology

- 3.2.1 Desk study records relating to protected and/or notable flora (including veteran trees) were obtained from the following data sources:

- Natural England (2009) Citation for Berkswell Marsh SSSI²⁸;
- Natural England (2010) Citation for River Blythe SSSI²⁹;
- Natural England (2008) Citation for Coleshill & Bannerly Pools SSSI³⁰;
- Natural England (1983) Coleshill Pool and Bog Botanical Survey³¹;
- Natural England (1998-2009) Berkswell Marsh Botanical Surveys³²;
- Warwickshire Biological Records Centre (2012) Phase 1 Habitat Mapping³³;
- Warwickshire Biological Records Centre (2012) Phase 1 Habitat Target Notes³⁴;
- Warwickshire Biological Records Centre (2012) Notable Plants³⁵;
- Warwickshire Biological Records Centre (2012) Veteran Trees³⁶;
- Warwickshire Biological Records Centre (2012) Black Poplar³⁷;
- Warwickshire Biological Records Centre (2001) Warwickshire Site of Importance for Nature Conservation: Wildlife Site Evaluation for Berkswell Marsh Meadow³⁸;
- Warwickshire Biological Records Centre (2008) Warwickshire Site of Importance for Nature Conservation: Wildlife Site Evaluation for Mouldings

²⁸ Natural England (2009) Citation for Berkswell Marsh SSSI

²⁹ Natural England (2010) Citation for River Blythe SSSI

³⁰ Natural England (2008) Citation for Coleshill & Bannerly Pools SSSI

³¹ Natural England (1983) Coleshill Pool and Bog Botanical Survey

³² Natural England (1998-2009) Berkswell Marsh Botanical Surveys

³³ Warwickshire Biological Records Centre; Warwickshire Museum; <http://heritage.warwickshire.gov.uk/ecology/data-and-ecological-records/warwickshire-biological-records-centre/>; contacted April 2012

³⁴ Warwickshire Biological Records Centre; Warwickshire Museum; <http://heritage.warwickshire.gov.uk/ecology/data-and-ecological-records/warwickshire-biological-records-centre/>; contacted April 2012

³⁵ Warwickshire Biological Records Centre; Warwickshire Museum; <http://heritage.warwickshire.gov.uk/ecology/data-and-ecological-records/warwickshire-biological-records-centre/>; contacted April 2012

³⁶ Warwickshire Biological Records Centre; Warwickshire Museum; <http://heritage.warwickshire.gov.uk/ecology/data-and-ecological-records/warwickshire-biological-records-centre/>; contacted April 2012

³⁷ Warwickshire Biological Records Centre; Warwickshire Museum; <http://heritage.warwickshire.gov.uk/ecology/data-and-ecological-records/warwickshire-biological-records-centre/>; contacted April 2012

³⁸ Warwickshire Biological Records Centre (2001) Warwickshire Site of Importance for Nature Conservation: Wildlife Site Evaluation for Berkswell Marsh Meadow

Green Farm³⁹;

- Warwickshire Biological Records Centre (2001) Warwickshire Site of Importance for Nature Conservation: Wildlife Site Evaluation for Denbigh Spinney⁴⁰;
- Warwickshire Biological Records Centre (2000) Warwickshire Site of Importance for Nature Conservation: Wildlife Site Evaluation for Coleshill Pool Wood⁴¹;
- Warwickshire Biological Records Centre (2011) Local Wildlife Sites Evaluation Form: Patrick Farm Meadow⁴²;
- EcoRecord (2004) Review of Birmingham's Sites of Importance for Nature Conservation (SINCs) - Water Orton Sidings⁴³;
- EcoRecord (1995) Birmingham Management Plan New Saltley Pool⁴⁴
- EcoRecord (2007) Review of Birmingham's Sites of Importance for Nature Conservation (SINCs) - Park Hall SINC⁴⁵;
- EcoRecord (2007) SINC Criteria Evaluation Form - Park Hall⁴⁶;
- EcoRecord (1997) Sunley Wildlife Fund Survey - Park Hall Wood⁴⁷;
- EcoRecord (1989) Birmingham Local Site Survey - Land at Warren Road⁴⁸;
- EcoRecord (1990) Birmingham Local Site Survey - River Tame⁴⁹;
- EcoRecord (1990) Birmingham Local Site Survey - River Rea and adjoining land⁵⁰;
- EcoRecord (1990) Birmingham Local Site Survey - Grand Union Canal⁵¹;
- EcoRecord (1990) Birmingham Local Site Survey - Digbeth Branch Canal⁵²;
- Amey (2011) MAC 9 Outfall Surveys Phase 1 Habitat Survey - Site 5⁵³;
- Halcrow (2005) Supporting Information (Ecological Assessment) for the Outline Planning Application at the former Alstrom Site, Washwood Heath,

³⁹ Warwickshire Biological Records Centre (2008) Warwickshire Site of Importance for Nature Conservation: Wildlife Site Evaluation for Mouldings Green Farm

⁴⁰ Warwickshire Biological Records Centre (2001) Warwickshire Site of Importance for Nature Conservation: Wildlife Site Evaluation for Denbigh Spinney

⁴¹ Warwickshire Biological Records Centre (2000) Warwickshire Site of Importance for Nature Conservation: Wildlife Site Evaluation for Coleshill Pool Wood

⁴² Warwickshire Biological Records Centre (2011) Local Wildlife Sites Evaluation Form: Patrick Farm Meadow

⁴³ EcoRecord (2004) Review of Birmingham's Sites of Importance for Nature Conservation (SINCs) - Water Orton Sidings

⁴⁴ EcoRecord (1995) Birmingham Management Plan New Saltley Pool

⁴⁵ EcoRecord (2007) Review of Birmingham's Sites of Importance for Nature Conservation (SINCs) - Park Hall SINC

⁴⁶ EcoRecord (2007) SINC Criteria Evaluation Form - Park Hall

⁴⁷ EcoRecord (1997) Sunley Wildlife Fund Survey - Park Hall Wood

⁴⁸ EcoRecord (1989) Birmingham Local Site Survey - Land at Warren Road

⁴⁹ EcoRecord (1990) Birmingham Local Site Survey - River Tame

⁵⁰ EcoRecord (1990) Birmingham Local Site Survey - River Rea and adjoining land

⁵¹ EcoRecord (1990) Birmingham Local Site Survey - Grand Union Canal

⁵² EcoRecord (1990) Birmingham Local Site Survey - Digbeth Branch Canal

⁵³ Amey (2011) MAC 9 Outfall Surveys Phase 1 Habitat Survey - Site 5

Birmingham⁵⁴;

- Middlemarch Environmental Ltd. (2011) Park Farm, Middle Bickenhill - Extended Phase 1 Habitat Survey⁵⁵;
- Hallettec Associates (2006) Meriden Quarry - Environmental Statement⁵⁶; and
- Apted S.M., Davies B. and Burgoine M. (1987) Plants found along the River Blythe between Mouldings Green Farm, Patrick Bridge, and Packhorse Bridge⁵⁷.

- 3.2.2 In addition, records of protected and/or notable flora were made during the course of Phase 1 Habitat and NVC surveys conducted in support of the Proposed Scheme.
- 3.2.3 Species were assessed in relation to their status as species of principal importance⁵⁸. In July 2012 the UK Biodiversity Action Plan (BAP) was succeeded by the UK Post-2010 Biodiversity Framework⁵⁹. The UK list of BAP species remains an important reference source.
- 3.2.4 Species were also assessed against the International Union for Conservation of Nature (IUCN) Red List of threatened species⁶⁰, against 'The Vascular Plant Red Data List for Great Britain'⁶¹ and against Schedule 8 of Wildlife and Countryside Act 1981⁶² (as amended).
- 3.2.5 Plants found within Warwickshire were assessed against 'A checklist of the higher plants of Vice-County Warwickshire'⁶³. This document designated certain plants as Warwickshire Notable (i.e. scarce in a county context or indicative of a particularly fine habitat') or as a Warwickshire Rarity (i.e. rare in a county context).
- 3.2.6 Plants found within Birmingham and the Black Country were assessed as uncommon, rare or very rare. Uncommon species are present within 4.3%-12% of 1km squares, tetrads or 5km squares. Rare species are present within 1.0%-4.3% of 1km squares, tetrads or 5km squares. Very rare species are present in less than 1% of 1km squares, tetrads or 5km squares⁶⁴.

3.3 Deviations, constraints and limitations

- 3.3.1 Verification of notable plants recorded in desk study records was not possible in all cases, as desk study data and land access were not always available at the right time of year, to allow for verification through field survey.

⁵⁴ Halcrow (2005) Supporting Information (Ecological Assessment) for the Outline Planning Application at the former Alstrom Site, Washwood Heath, Birmingham

⁵⁵ Middlemarch Environmental Ltd. (2011) Park Farm, Middle Bickenhill - Extended Phase 1 Habitat Survey

⁵⁶ Hallettec Associates (2006) Meriden Quarry - Environmental Statement

⁵⁷ Apted S.M., Davies B. and Burgoine M. (1987) Plants found along the River Blythe between Mouldings Green Farm, Patrick Bridge, and Packhorse Bridge

⁵⁸ These are species listed as 'species of principal importance' on Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006.

⁵⁹ JNCC and Defra (on behalf of the Four Countries' Biodiversity Group) (2012) *UK Post-2012 Biodiversity Framework*.

⁶⁰ IUCN Red List; The IUCN Red List of Threatened Species; <http://www.iucnredlist.org/>; accessed 05 May 2013.

⁶¹ Cheffings C. and Farrell L. (2005) The Vascular Plant Red Data List for Great Britain (ISSN 1473-0154) updated in 2006 and found on JNCC website; Conservation Designations for UK Taxa; <http://jncc.defra.gov.uk/default.aspx?page=3408>; accessed 11 September 2013

⁶² The National Archives; The Wildlife and Countryside Act 1981; <http://www.legislation.gov.uk/ukpga/1981/69/contents>; accessed: July 2012

⁶³ BSBI; A checklist of the higher plants of Vice-County Warwickshire; <http://bsbi.org.uk/warwickshire.html>; accessed: 15 May 2013

⁶⁴ EcoRecord (2007), Review of Birmingham's Sites of Importance for Nature Conservation (SINCS).

- 3.3.2 In relation to desk study data, locations of notable plants were not always received as six-figure grid references and could therefore not be related to a specific location. Wherever possible, additional notes supplied with the records were used to attempt to more accurately locate the record. It has been assumed however, that if a land parcel within which a notable species has been recorded falls partly within the land required for the construction of the Proposed Scheme, that the species is recorded as falling within the land required for the construction of the Proposed Scheme.

3.4 Baseline

- 3.4.1 Those records of protected and/or notable species (including non-native invasive species) which were located within or adjacent to the land required for the construction of the Proposed Scheme, or are considered potentially subject to adverse effects are reported here.

Desk study

- 3.4.2 A summary of desk study records of protected or notable flora considered relevant to the assessment is provided in Table 3 and Table 4.

Table 3: Desk study records of protected and/or notable species records relevant to the assessment in CFA23, CFA24, CFA25 and CFA26

Common name	Scientific name	Status	Location	OS grid reference	CFA	Distance from land required for the construction of the Proposed Scheme ⁶⁵ (m) and orientation
Annual knawel	<i>Scleranthus annuus</i>	SPI; IUCN Endang.	North-west of The Roughs and south of Park Farm House	SP 232 793	23	Within land required
Black poplar	<i>Populus nigra</i> ssp. <i>betulifolia</i>	WN	South of Stonebridge island	SP 215 830	23	Within land required
Blue water-speedwell	<i>Veronica anagallis-aquatica</i>	WR	Land south-west of Mouldings Green Farm	SP 215 818	23	Within land required
Bluebell	<i>Hyacinthoides non-scripta</i>	WCA: Sch 8	Wood north-east of Lodge Farm	SP 237 786	23	Within land required
Bluebell	<i>Hyacinthoides non-scripta</i>	WCA: Sch 8	Wood north of Lodge Farm	SP 232 787	23	Within land required
Bluebell	<i>Hyacinthoides non-scripta</i>	WCA: Sch 8	Mouldings Green Farm	SP 215 818	23	Within land required
Bluebell	<i>Hyacinthoides non-scripta</i>	WCA: Sch 8	Wood north-east of Lodge Farm	SP 241 784	23	Within land required
Bog stitchwort	<i>Stellaria alsine</i>	WN	River Blythe SSSI	SP 215 813	23	Within land required
Bottle sedge	<i>Carex rostrata</i>	WR	River Blythe SSSI	SP 215 813	23	Within land required

⁶⁵ The phrase 'Within land required' represents an abbreviation of this term

Common name	Scientific name	Status	Location	OS grid reference	CFA	Distance from land required for the construction of the Proposed Scheme ⁶⁵ (m) and orientation
Bristle club-rush	<i>Isolepis setacea</i>	WR	Berkswell Marsh SSSI	SP 226 799	23	Within land required
Crested dog's-tail	<i>Cynosurus cristatus</i>	WN	Berkswell Marsh SSSI	SP 226 799	23	Within land required
Crested dog's-tail	<i>Cynosurus cristatus</i>	WN	River Blythe SSSI	SP 215 813	23	Within land required
Crested dog's-tail	<i>Cynosurus cristatus</i>	WN	Patrick Farm	SP 212 823	23	Within land required
Devil's bit scabious	<i>Succisa pratensis</i>	WN	Berkswell Marsh SSSI	SP 227 798	23	Within land required
Great burnet	<i>Sanguisorba officinalis</i>	WN	Berkswell Marsh SSSI	SP 225 800	23	Within land required
Great burnet	<i>Sanguisorba officinalis</i>	WN	Patrick Farm	SP 212 823	23	Within land required
Great burnet	<i>Sanguisorba officinalis</i>	WN	Berkswell Marsh SSSI	SP 226 799	23	Within land required
Grey willow	<i>Salix cinerea</i>	WR ⁶⁶	Wood north-east of Lodge Farm	SP 238 783	23	Within land required
Long-leaved water crowfoot	<i>Ranunculus fluitans</i> agg.	WR	River Blythe SSSI	SP 215 813	23	Within land required
Marsh bedstraw	<i>Galium palustre</i>	WN	Wood east of Berkswell Marsh SSSI	SP 228 795	23	Within land required
Meadow fescue	<i>Schedonorus pratensis</i>	WN	Patrick Farm Meadow LWS	SP 217 809	23	Within land required
Oval sedge	<i>Carex ovalis</i>	WN	Berkswell Marsh SSSI	SP 226 799	23	Within land required
Remote sedge	<i>Carex remota</i>	WN	Patrick Farm Meadow LWS	SP 217 809	23	Within land required
Sharp-flowered rush	<i>Juncus acutiflorus</i>	WR	Berkswell Marsh SSSI	SP 226 799	23	Within land required
Southern lady's-mantle	<i>Alchemilla filicaulis</i>	WN	Patrick Farm Meadow LWS	SP 217 809	23	Within land required
Square stalked St. John's-wort	<i>Hypericum tetrapterum</i>	WN	Patrick Farm Meadow LWS	SP 217 809	23	Within land required

⁶⁶ There are two ssp. of *Salix cinerea*, of which ssp. *cinerea* is WR and ssp. *oleifolia* is not notable.

Common name	Scientific name	Status	Location	OS grid reference	CFA	Distance from land required for the construction of the Proposed Scheme ⁶⁵ (m) and orientation
Square stalked St. John's-wort	<i>Hypericum tetrapterum</i>	WN	Berkswell Marsh SSSI	SP 226 799	23	Within land required
Un-branched bur-reed	<i>Sparganium emersum</i>	WN	River Blythe	SP 215 813	23	Within land required
Bee orchid	<i>Ophrys apifera</i>	WN	East of Park Farm	SP 211 834	24	Within land required
Bluebell	<i>Hyacinthoides non-scripta</i>	WCA: Sch 8	Park Farm	SP 207 835	24	Within land required
Bluebell	<i>Hyacinthoides non-scripta</i>	WCA: Sch 8	Wood east of Park Farm	SP 209 839	24	Within land required
Bluebell	<i>Hyacinthoides non-scripta</i>	WCA: Sch 8	Denbigh Spinney LWS	SP 204 843	24	Within land required
Bluebell	<i>Hyacinthoides non-scripta</i>	WCA: Sch 8	Coleshill & Bannerly Pools SSSI	SP 199 858	24	Less than 100m
Bluebell	<i>Hyacinthoides non-scripta</i>	WCA: Sch 8	Coleshill Pool Wood LWS	SP 196 857	24	Within land required
Bottle sedge	<i>Carex rostrata</i>	WR	Coleshill & Bannerly Pools SSSI	SP 199 858	24	Less than 100m west
Crested dog's-tail	<i>Cynosurus cristatus</i>	WN	East of National Exhibition Centre (NEC)	SP 202 837	24	Within land required
Crested dog's-tail	<i>Cynosurus cristatus</i>	WN	Park Farm	SP 204 832	24	Within land required
Cross-leaved heath	<i>Erica tetralix</i>	WR	Coleshill & Bannerly Pools SSSI	SP 199 858	24	Less than 100m west
Floating clubrush	<i>Eleogiton fluitans</i>	WR	Park Farm	SP 200 840	24	Within land required
Greater tussock-sedge	<i>Carex paniculata</i>	WN	Coleshill & Bannerly Pools SSSI	SP 199 858	24	Less than 100m west
Grey willow	<i>Salix cinerea</i>	WR	Coleshill & Bannerly Pools SSSI	SP 200 857	24	Less than 100m west
Grey willow	<i>Salix cinerea</i>	WR	Coleshill Wood LWS	SP 196 857	24	Within land required
Heath bedstraw	<i>Galium saxatile</i>	WN	Coleshill & Bannerly Pools	SP 199 858	24	Less than 100m west

Common name	Scientific name	Status	Location	OS grid reference	CFA	Distance from land required for the construction of the Proposed Scheme ⁶⁵ (m) and orientation
			SSSI			
Heath bedstraw	<i>Galium saxatile</i>	WN	Coleshill Wood LWS	SP 196 857	24	Within land required
Heather	<i>Calluna vulgaris</i>	WN	Coleshill & Bannerly Pools SSSI	SP 199 858	24	Less than 100m west
Long-stalked cranesbill	<i>Geranium columbinum</i>	WR	Park Farm	SP 205 841	24	Within land required
Marsh cinquefoil	<i>Potentilla palustris</i>	WR	Park Farm	SP 210 840	24	Within land required
Marsh violet	<i>Viola palustris</i>	WR	Coleshill & Bannerly Pools SSSI	SP 199 858	24	Less than 100m west
Purple moor-grass	<i>Molinia caerulea</i>	WN	Coleshill & Bannerly Pools SSSI	SP 199 858	24	Less than 100m west
Ragged robin	<i>Silene flos-cuculi</i>	WN	Island south of Coleshill Pool Wood LWS	SP 197 854	24	Within land required
Remote sedge	<i>Carex remota</i>	WN	Denbigh Spinney LWS	SP 204 843	24	Within land required
Round-leaved cranesbill	<i>Geranium rotundifolium</i>	WR	Park Farm	SP 205 841	24	Within land required
Wavy hair-grass	<i>Deschampsia flexuosa</i>	WN	Coleshill & Bannerly Pools SSSI	SP 199 858	24	Less than 100m west
Wavy hair-grass	<i>Deschampsia flexuosa</i>	WN	Coleshill Wood LWS	SP 196 857	24	Within land required
Betony	<i>Betonica officinalis</i>	BBC Uncommon	Park Hall SINC	SP 16033 90911	25	Within land required
Bluebell	<i>Hyacinthoides non-scripta</i>	WCA: Sch 8	Park Hall SINC	SP 156 907	25	Within land required
Bluebell	<i>Hyacinthoides non-scripta</i>	WCA: Sch 8	Park Hall SINC	SP 165 910	25	Within land required
Bog stitchwort	<i>Stellaria alsine</i>	BBC Uncommon	Park Hall SINC	SP 162 910	25	Within land required
Bog stitchwort	<i>Stellaria alsine</i>	BBC Uncommon	Park Hall SINC	SP 160 909	25	Within land required
Bristly	<i>Picris echioides</i>	BBC	Park Hall SINC	SP 160	25	Within land required

Common name	Scientific name	Status	Location	OS grid reference	CFA	Distance from land required for the construction of the Proposed Scheme ⁶⁵ (m) and orientation
oxtongue		Uncommon		909		
Broad-leaved helleborine	<i>Epipactis helleborine</i>	BBC Rare	Park Hall SINC	SP 155 907	25	Within land required
Common meadow-rue	<i>Thalictrum flavum</i>	BBC Very Rare	Park Hall SINC	SP 165 911	25	Within land required
Common spike-rush	<i>Eleocharis palustris</i>	BBC Uncommon	Park Hall SINC	SP 160 909	25	Within land required
Crow garlic	<i>Allium vineale</i>	BBC Rare	Park Hall SINC	SP 160 909	25	Within land required
Devil's bit scabious	<i>Succisa pratensis</i>	BBC Uncommon	Park Hall SINC	SP 162 910	25	Within land required
Glaucous sedge	<i>Carex flacca</i>	BBC Uncommon	Park Hall SINC	SP 160 909	25	Within land required
Great pond-sedge	<i>Carex riparia</i>	BBC Rare	Park Hall SINC	SP 160 909	25	Within land required
Greater burdock	<i>Arctium lappa</i>	BBC Uncommon	Park Hall SINC	SP 160 909	25	Within land required
Greater yellow-cress	<i>Rorippa amphibia</i>	BBC Uncommon	Park Hall SINC	SP 160 909	25	Within land required
Hybrid campion	<i>Silene x hampeana</i>	BBC Uncommon	Park Hall SINC	SP 160 909	25	Within land required
Marsh stitchwort	<i>Stellaria palustris</i>	SPI; IUCN Vuln.; BBC Very Rare	Park Hall SINC	SP 160 909	25	Within land required
Nodding bur-marigold	<i>Bidens cernua</i>	BBC Rare	Park Hall SINC	SP 160 909	25	Within land required
Pink water-speedwell	<i>Veronica catenata</i>	BBC Very Rare	Park Hall SINC	SP 160 909	25	Within land required
Purple-loosestrife	<i>Lythrum salicaria</i>	BBC Uncommon	Park Hall SINC	SP 160 909	25	Within land required
River water-crowfoot	<i>Ranunculus fluitans</i>	BBC Very Rare	Park Hall SINC	SP 160 909	25	Within land required
Small leaved lime	<i>Tilia cordata</i>	BBC Uncommon	Park Hall SINC	SP 165 910	25	Within land required
Small sweet-grass	<i>Glyceria declinata</i>	BBC Uncommon	Park Hall SINC	SP 160 909	25	Within land required
Sneezewort	<i>Achillea ptarmica</i>	BBC Uncommon	Park Hall SINC	SP 162 910	25	Within land required
Soft shield-	<i>Polystichum</i>	BBC Rare	Park Hall SINC	SP 160	25	Within land required

Common name	Scientific name	Status	Location	OS grid reference	CFA	Distance from land required for the construction of the Proposed Scheme ⁶⁵ (m) and orientation
fern	<i>setiferum</i>			909		
Spiked sedge	<i>Carex spicata</i>	BBC Rare	Park Hall SINC	SP160 909	25	Within land required
Sweet briar	<i>Rosa rubiginosa</i> agg.	BBC Rare	Park Hall SINC	SP 160 909	25	Within land required
Upright hedge-parsley	<i>Torilis japonica</i>	BBC Uncommon	Park Hall SINC	SP 160 909	25	Within land required
Water chickweed	<i>Myosoton aquaticum</i>	BBC Rare	Park Hall SINC	SP 160 909	25	Within land required
Water pepper	<i>Persicaria hydropiper</i>	BBC Uncommon	Park Hall SINC	SP 160 909	25	Within land required
Bullace	<i>Prunus domestica</i> ssp. <i>insititia</i>	BBC Rare	Park Hall SINC	SP 160 909	25	Within land required
Wood millet	<i>Milium effusum</i>	BBC Uncommon	Park Hall SINC	SP 164 910	25	Within land required
Wood sorrel	<i>Oxalis acetosella</i>	BBC Uncommon	Park Hall SINC	SP 160 909	25	Within land required
Yellow archangel	<i>Lamiastrum galeobdolon</i>	BBC Uncommon	Park Hall SINC	SP 164 910	25	Within land required

Designations: SPI = species of principal importance (Section 41 of NERC Act 2006); IUCN Endang. = Endangered (IUCN Red List); IUCN Vuln. = Endangered (IUCN Red List); NS = Nationally scarce based on the Vascular Plant Red Data List for Great Britain; WN=Warwickshire Notable; WR = Warwickshire Rarity; WCA Sch 8 = Listed on Schedule 8 of Wildlife and Countryside Act (as amended); BBC Uncommon = Birmingham and Black Country Uncommon; BCC Rare = Birmingham and Black Country Rare; BCC Very Rare = Birmingham and Black Country Very Rare.

Table 4: Desk study records of non-native invasive plant species listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) in CFA23, CFA24, CFA25 and CFA26

Common name	Scientific name	Location	OS grid reference	CFA	Distance from land required for the construction of the Proposed Scheme ⁶⁷ (m) and orientation
Indian balsam	<i>Impatiens glandulifera</i>	Mouldings Green Farm	SP 215 818	23	Within land required
Rhododendron	<i>Rhododendron ponticum</i>	Coleshill & Bannerly Pools SSSI	SP 200 857	24	Less than 100m west
Variegated yellow archangel	<i>Lamiastrum galeobdolon</i> subsp. <i>argentatum</i>	Denbigh Spinney LWS	SP 204 843	24	Within land required
Indian balsam	<i>Impatiens glandulifera</i>	Park Hall SINC	SP 163 909	25	Within land required

⁶⁷ The phrase 'Within land required' represents an abbreviation of this term

Common name	Scientific name	Location	OS grid reference	CFA	Distance from land required for the construction of the Proposed Scheme ⁶⁷ (m) and orientation
Japanese knotweed	<i>Fallopia japonica</i>	Park Hall SINC	SP 159 909	25	Within land required
Japanese knotweed	<i>Fallopia japonica</i>	Park Hall SINC	SP 163 909	25	Within land required
Japanese knotweed	<i>Fallopia japonica</i>	Park Hall SINC	SP 165 915	25	Within land required
Nuttall's Waterweed	<i>Elodea nuttallii</i>	Park Hall SINC	SP 159 909	25	Within land required
Water fern	<i>Azolla filiculoides</i>	Park Hall SINC	SP 159 909	25	Within land required
Water fern	<i>Azolla filiculoides</i>	Park Hall SINC	SP 159 908	25	Within land required
Japanese knotweed	<i>Fallopia japonica</i>	Washwood Heath	SP 099 890	26	Within land required

Field survey

- 3.4.3 A summary of field survey records of protected or notable flora considered relevant to the assessment is provided in Table 5 and Table 6.

Table 5: Records of protected and or notable species records relevant to the assessment obtained during field survey in CFA23, CFA24, CFA25 and CFA26

Common name	Scientific name	Status	Location	OS grid reference	CFA	Distance from land required for the construction of the Proposed Scheme ⁶⁸ (m) and orientation
Bee orchid	<i>Ophrys apifera</i>	WN	Stonebridge	SP 21434 83087	23	Within land required
Great burnet	<i>Sanguisorba officinalis</i>	WN	Mouldings Green Farm	SP 21394 81739	23	Within land required
Great burnet	<i>Sanguisorba officinalis</i>	WN	Patrick Farm Meadow LWS	SP 21735 80847	23	Within land required
Hairy lady's mantle	<i>Alchemilla filicaulis</i> ssp. <i>vestita</i>	WN	Patrick Farm Meadow LWS	SP 21759 80921	23	Within land required
Crested dog's-tail	<i>Cynosurus cristatus</i>	WN	West of Tame Valley Academy	SP 21119 81483	23	Within land required
Alder buckthorn	<i>Frangula alnus</i>	WN	Coleshill & Bannerly Pools SSSI	SP 19775 85865	24	40m, east
Bog stitchwort	<i>Stellaria alsine</i>	WN	Hollywell Brook	SP 20697 83543	24	Within land required
Bog stitchwort	<i>Stellaria alsine</i>	WN	Wood east of Park Farm	SP 20911 83888	24	40m, north-east
Bottle Sedge	<i>Carex rostrata</i>	WR	Coleshill & Bannerly Pools SSSI	SP 19915 85835	24	110m, east
Bugloss	<i>Anchusa arvensis</i>	WN	Common Farm	SP20199 84735	24	Within land required
Common sedge	<i>Carex nigra</i>	WN	Hollywell Brook	SP 20674 83551	24	Within land required
Crested dog's-tail	<i>Cynosurus cristatus</i>	WN	Park Farm	SP 20777 83375	24	Within land required
Cross-leaved heath	<i>Erica tetralix</i>	WR	Coleshill & Bannerly Pools SSSI	SP 19915 85875	24	130m, east
Floating clubrush	<i>Eleogiton fluitans</i>	WR	Land west of Denbigh Spinney LWS	SP 20364 84333	24	Within land required
Greater tussock-sedge	<i>Carex paniculata</i>	WN	Coleshill & Bannerly Pools SSSI	SP 19935 85785	24	120m, east
Hare's-tail cotton-grass	<i>Eriophorum vaginatum</i>	WR	Coleshill & Bannerly Pools SSSI	SP 19885 85955	24	150m, east
Heath bedstraw	<i>Galium saxatile</i>	WN	Coleshill Wood LWS	SP 19711 85529	24	Within land required
Heath bedstraw	<i>Galium saxatile</i>	WN	Coleshill & Bannerly Pools SSSI	SP 19771 85837	24	20m, east
Marsh violet	<i>Viola palustris</i>	WR	Denbigh Spinney LWS	SP 20436 84333	24	Within land required
Marsh-bedstraw	<i>Galium palustre</i>	WR	Hollywell Brook	SP 20697 83543	24	Within land required
Purple moor-grass	<i>Molinia caerulea</i>	WN	Coleshill & Bannerly Pools SSSI	SP 19895 85935	24	140m, east
Southern marsh-orchid	<i>Dactylorhiza praetermissa</i>	WN	Coleshill & Bannerly Pools SSSI	SP 20025 85783	24	50m, east
Wavy hair-grass	<i>Deschampsia flexuosa</i>	WN	Coleshill & Bannerly Pools SSSI	SP 19945 86207	24	50m, east
Wavy hair-grass	<i>Deschampsia flexuosa</i>	WN	Coleshill Wood LWS	SP 19711 85529	24	Within land required
White sedge	<i>Carex canescens</i>	WR	Coleshill & Bannerly Pools SSSI	SP 19895 85935	24	140m, east
Bog stitchwort	<i>Stellaria alsine</i>	BBC Uncommon	Park Hall SINC	SP 15407 90720	25	Within land required
Dittander	(<i>Dittander latifolium</i>) <i>Lepidium latifolium</i>	NS; BBC Rare	Park Hall SINC	SP 15620 90890	25	Within land required
River water-crowfoot	<i>Ranunculus fluitans</i>	BBC Very Rare	Park Hall SINC	SP 15129 90753	25	Within land required
River water-crowfoot	<i>Ranunculus fluitans</i>	BBC Very Rare	River Tame	SP 11774 89546	25	Within land required
Small leaved	<i>Tilia cordata</i>	BBC	Park Hall SINC	SP 16385 91009	25	Within land required

⁶⁸ The phrase 'Within land required' represents an abbreviation of this term

Common name	Scientific name	Status	Location	OS grid reference	CFA	Distance from land required for the construction of the Proposed Scheme ⁶⁸ (m) and orientation
lime		Uncommon				
Kidney vetch	<i>Anthyllis vulneraria</i>	BBC Uncommon	Washwood Heath Depot	SP 10308 88984	26	Within land required

Table 6: Field survey records of non-native invasive plant species listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) in CFA23, CFA24, CFA25 and CFA26

Common name	Scientific name	Location	OS grid reference	CFA	Distance from land required for the construction of the Proposed Scheme ⁶⁹ (m) and orientation
Cotoneaster sp.	<i>Cotoneaster</i> sp.	Patrick Farm	SP 21229 81693	23	Within land required
Cotoneaster sp.	<i>Cotoneaster</i> sp.	Lincoln Farm	SP 22085 79853	23	30m, south-west
Cotoneaster sp.	<i>Cotoneaster</i> sp.	Land east of Berkswell Station	SP 24808 77653	23	40m, north-east
Cotoneaster sp.	<i>Cotoneaster</i> sp.	Lavender Hall Farm	SP 23908 78067	23	10m, south- west
Cotoneaster sp.	<i>Cotoneaster</i> sp.	Lavender Hall Farm	SP 23991 78055	23	40m, south-west
Cotoneaster sp.	<i>Cotoneaster</i> sp.	Lavender Hall Farm	SP 24028 77953	23	Within land required
Giant hogweed	<i>Heracleum mantegazzianum</i>	Land west of Berkswell Station	SP 24365 77667	23	110m, south-west
Indian balsam	<i>Impatiens glandulifera</i>	Patrick Farm	SP 21506 81763	23	10m, north-east
Indian balsam	<i>Impatiens glandulifera</i>	Marsh Lane Nature Reserve	SP 21555 80029	23	420m, south-west
Indian balsam	<i>Impatiens glandulifera</i>	Patrick Farm	SP 21425 81755	23	Within land required
Japanese knotweed	<i>Fallopia japonica</i>	Lincoln Farm	SP 22075 79846	23	40m, south-west
Japanese knotweed	<i>Fallopia japonica</i>	Lavender Hall Farm	SP 24138 78006	23	Within land required
Montbretia	<i>Crocasmia x crocosmiiflora</i>	House north of Lodge Farm	SP 23274 78643	23	20m, south-west
Montbretia	<i>Crocasmia x crocosmiiflora</i>	Lavender Hall Farm	SP 23883 78059	23	10m, south-west

⁶⁹ The phrase 'Within land required' represents an abbreviation of this term

Common name	Scientific name	Location	OS grid reference	CFA	Distance from land required for the construction of the Proposed Scheme ⁶⁹ (m) and orientation
New Zealand pigmyweed	<i>Crassula helmsii</i>	Beechwood Farm	SP 25273 77148	23	Within land required
Rhododendron	<i>Rhododendron ponticum</i>	Wood north of Lodge Farm Coleshill & Bannerly Pools SSSI	SP 23290 79145	23	20m north-east
Rhododendron sp.	<i>Rhododendron</i> sp.	House north of Lodge Farm	SP 23257 78660	23	20m, south-west
Rhododendron sp.	<i>Rhododendron</i> sp.	House north of Lodge Farm	SP 23231 78676	23	10m, south-west
Three cornered garlic	<i>Allium triquetrum</i>	House north of Lodge Farm	SP 23267 78651	23	20m, south-west
Variegated yellow archangel	<i>Lamium galeobdolon subsp. argentatum</i>	House north of Lodge Farm	SP 23238 78678	23	20m, south-west
Variegated yellow archangel	<i>Lamium galeobdolon subsp. argentatum</i>	House north of Lodge Farm	SP 23242 78676	23	20m, south-west
Variegated yellow archangel	<i>Lamium galeobdolon subsp. argentatum</i>	House north of Lodge Farm	SP 23248 78659	23	10m, south-west
Variegated yellow archangel	<i>Lamium galeobdolon subsp. argentatum</i>	House north of Lodge Farm	SP 23271 78638	23	10m, south-west
Variegated yellow archangel	<i>Lamium galeobdolon subsp. argentatum</i>	House north of Lodge Farm	SP 23272 78665	23	10m, south-west
Water fern	<i>Azolla filiculoides</i>	Land east of Balsall Common	SP 24565 77097	23	370m, south-west
Japanese knotweed	<i>Fallopia japonica</i>	Park Farm	SP 20432 84291	24	Within land required
Japanese knotweed	<i>Fallopia japonica</i>	Land west of Denbigh Spinney	SP 20457 84281	24	Within land required
Japanese knotweed	<i>Fallopia japonica</i>	Land west of Denbigh Spinney	SP 20412 84287	24	Within land required
Variegated yellow archangel	<i>Lamium galeobdolon subsp. argentatum</i>	Land west of Denbigh Spinney	SP 20454 84275	24	Within land required
Variegated yellow archangel	<i>Lamium galeobdolon subsp. argentatum</i>	Land west of Denbigh Spinney	SP 20440 84275	24	Within land required
Cotoneaster sp.	<i>Cotoneaster</i> sp.	Fort Dunlop	SP 12512	25	140m, north

Common name	Scientific name	Location	OS grid reference	CFA	Distance from land required for the construction of the Proposed Scheme ⁶⁹ (m) and orientation
			90087		
Indian balsam	<i>Impatiens glandulifera</i>	Bromford Drive	SP 12560 89620	25	240m, south
Indian balsam	<i>Impatiens glandulifera</i>	Bromford Drive	SP 12590 89650	25	250m, south
Indian balsam	<i>Impatiens glandulifera</i>	Channel north of River Tame SLINC	SP 14740 90691	25	Within land required
Indian balsam	<i>Impatiens glandulifera</i>	Park Hall SINC	SP 15432 90689	25	Within land required
Indian balsam	<i>Impatiens glandulifera</i>	Park Hall SINC	SP 16101 90917	25	Within land required
Indian balsam	<i>Impatiens glandulifera</i>	Park Hall SINC	SP 16235 90904	25	Within land required
Indian balsam	<i>Impatiens glandulifera</i>	Park Hall SINC	SP 16497 91117	25	60m, north
Indian balsam	<i>Impatiens glandulifera</i>	Land north of Park Hall SINC	SP 15740 91000	25	Within land required
Japanese knotweed	<i>Fallopia japonica</i>	Castle Vale	SP 14038 90470	25	Within land required
Japanese knotweed	<i>Fallopia japonica</i>	Castle Vale	SP 14296 90551	25	10m, north
Japanese knotweed	<i>Fallopia japonica</i>	Plants Brook	SP 15048 90805	25	Within land required
Japanese knotweed	<i>Fallopia japonica</i>	Park Hall SINC	SP 15952 90919	25	Within land required
Japanese knotweed	<i>Fallopia japonica</i>	Park Hall SINC	SP 15960 90913	25	Within land required
Japanese knotweed	<i>Fallopia japonica</i>	Park Hall SINC	SP 16075 91049	25	Within land required
Japanese knotweed	<i>Fallopia japonica</i>	Bromford Drive	SP 12060 89830	25	70m, north
Japanese knotweed	<i>Fallopia japonica</i>	Land west of Fort Industrial Park	SP 13183 90263	25	110m, north
Japanese knotweed	<i>Fallopia japonica</i>	Land west of Fort Industrial Park	SP 13273 90246	25	140m, north
Japanese knotweed	<i>Fallopia japonica</i>	Bromford Road	SP 11733 89488	25	60m, south
Japanese knotweed	<i>Fallopia japonica</i>	Hurricane Park	SP 11260 89860	25	10m, north

Common name	Scientific name	Location	OS grid reference	CFA	Distance from land required for the construction of the Proposed Scheme ⁶⁹ (m) and orientation
Japanese rose	<i>Rosa rugosa</i>	Fort Dunlop	SP 12457 90073	25	140m, north
Water fern	<i>Azolla filiculoides</i>	Park Hall SINC	SP 16100 90934	25	Within land required
Water fern	<i>Azolla filiculoides</i>	Park Hall SINC	SP 15933 90845	25	Within land required
Water fern	<i>Azolla filiculoides</i>	Park Hall SINC	SP 15911 90923	25	Within land required
Cotoneaster sp.	<i>Cotoneaster</i> sp.	Land west of Bromford Central	SP 11642 89369	26	20m, south
Cotoneaster sp.	<i>Cotoneaster</i> sp.	Land south of the Birmingham and Derby rail line	SP 10205 89139	26	Within land required
Small-leaved cotoneaster	<i>Cotoneaster microphyllus</i>	Land west of Bromford Central	SP 11631 89324	26	60m, south
Small-leaved cotoneaster	<i>Cotoneaster microphyllus</i>	Land west of Bromford Central	SP 11654 89324	26	70m, south
Japanese knotweed	<i>Fallopia japonica</i>	Grand Union Canal SLINC	SP 08124 87122	26	Within land required

Discussion

- 3.4.4 Within the Balsall Common and Hampton-in-Arden area (CFA23), desk study and/or field survey provided records of 14 Warwickshire notable species and five Warwickshire rare species within or near the land required for the construction of the Proposed Scheme, some of which occurred at multiple locations. In addition to this, there are historical records of bluebell, a species listed on Schedule 8⁷⁰ of the Wildlife and Countryside Act 1981⁷¹ (as amended) from a number of locations within the land required for construction of the Proposed Scheme, and annual knawel, a species of principal importance, listed as endangered on the IUCN red list and nationally scarce in 'The Vascular Plant Red Data List for Great Britain'⁷² within the land required for the construction of the Proposed Scheme just south-east of Berkswell Marsh SSSI.
- 3.4.5 Within the Birmingham Interchange and Chelmsley Wood area (CFA24), desk study and field survey provided records of 14 Warwickshire notable species and 11 Warwickshire rare species within or near the land required for the construction of the Proposed Scheme, some of which occurred at multiple locations. In addition to this, there were records of bluebell within the land required for the construction of the Proposed Scheme.
- 3.4.6 Within the Castle Bromwich and Bromford area (CFA25), desk study and field survey provided records of 18 Birmingham and Black Country (BBC) uncommon species, nine BBC rare and three BBC very rare species within or near the land required for the construction of the Proposed Scheme, some of which occurred at multiple locations within this area. In addition to this, marsh stitchwort, recorded in desk study records in the floodplain at Park Hall Site of Importance for Nature Conservation (SINC), is a species of principal importance, BBC very rare and listed as vulnerable on the IUCN red list. Dittander, found during field surveys on the banks of the River Tame Site of Local Importance for Nature Conservation (SLINC), is BBC rare and listed as nationally scarce in 'The Vascular Plant Red Data List for Great Britain'. Broad-leaved helleborine, a BBC rare species and listed on the BBC Biodiversity Action Plan, was also recorded in the woods at Park Hall SINC, as well as bluebell.
- 3.4.7 Within the Washwood Heath to Curzon Street area (CFA26), one BBC uncommon species was recorded during field survey, kidney vetch (*Anthyllis vulneraria*).
- 3.4.8 Eleven non-native, invasive plant species listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) were found across the four areas. These comprised small-leaved cotoneaster, giant hogweed, Indian balsam (*Impatiens glandulifera*), Japanese knotweed, Japanese rose, montbretia, New Zealand pigmyweed, rhododendron, three cornered garlic, variegated yellow archangel and water fern (*Azolla filiculoides*).

⁷⁰ In respect of Section 13 (2) only.

⁷¹ The National Archives; The Wildlife and Countryside Act 1981; <http://www.legislation.gov.uk/ukpga/1981/69/contents>; accessed: July 2012

⁷² Cheffings C. and Farrell L. (2005) The Vascular Plant Red Data List for Great Britain (ISSN 1473-0154) updated in 2006 and found on JNCC website; Conservation Designations for UK Taxa; <http://jncc.defra.gov.uk/default.aspx?page=3408>; accessed 11 September 2013

4 Phase 1 Habitat Survey

4.1 Introduction

- 4.1.1 This section of the appendix presents details of Phase 1 Habitat Survey⁷³ data relevant to the section of the Proposed Scheme that will pass through CFA23, CFA24, CFA25 and CFA26.
- 4.1.2 While the field surveys were conducted as Extended Phase 1 Habitat Surveys (i.e. to include scoping for presence or potential to support protected and/or notable species) only the habitat survey elements are reported in this appendix. Outputs relating to protected and/or notable species are reported, where relevant, within the corresponding appendix for that species/species group.

4.2 Methodology

- 4.2.1 Details of the standard methodology used for Extended Phase 1 Habitat Survey are provided in Ecology technical note: Ecological field survey methods and standards (Volume 5: Appendix CT-001-000/2).
- 4.2.2 Where access was not available for field survey, data from pre-existing habitat surveys, where available, were used to provide a description of habitats. In all other cases, interpretation of aerial photography was used to provide an indication of the likely habitats present.
- 4.2.3 Pre-existing habitat survey data was obtained from the following sources:
- Natural England (2009) Citation for Berkswell Marsh SSSI⁷⁴;
 - Natural England (2010) Citation for River Blythe SSSI⁷⁵;
 - Natural England (2008) Citation for Coleshill & Bannerly Pools SSSI⁷⁶;
 - Natural England (1983) Coleshill Pool and Bog Botanical Survey⁷⁷;
 - Natural England (1998-2009) Berkswell Marsh Botanical Surveys⁷⁸;
 - Warwickshire Biological Records Centre (2012) Phase 1 Habitat Mapping⁷⁹;
 - Warwickshire Biological Records Centre (2012) Phase 1 Habitat Target Notes⁸⁰;
 - Warwickshire Biological Records Centre (2012) Notable Plants⁸¹;

⁷³ Phase 1 Habitat Survey is the standard system for classifying and mapping habitats. The methodology is defined within Joint Nature Conservation Committee (2010) Handbook for Phase 1 Habitat Survey - a technique for environmental audit. JNCC, Peterborough.

⁷⁴ Natural England (2009) Citation for Berkswell Marsh SSSI

⁷⁵ Natural England (2010) Citation for River Blythe SSSI

⁷⁶ Natural England (2008) Citation for Coleshill & Bannerly Pools SSSI

⁷⁷ Natural England (1983) Coleshill Pool and Bog Botanical Survey

⁷⁸ Natural England (1998-2009) Berkswell Marsh Botanical Surveys

⁷⁹ Warwickshire Biological Records Centre; Warwickshire Museum; <http://heritage.warwickshire.gov.uk/ecology/data-and-ecological-records/warwickshire-biological-records-centre/>; contacted April 2012

⁸⁰ Warwickshire Biological Records Centre; Warwickshire Museum; <http://heritage.warwickshire.gov.uk/ecology/data-and-ecological-records/warwickshire-biological-records-centre/>; contacted April 2012

- Warwickshire Biological Records Centre (2012) Veteran Trees;
- Warwickshire Biological Records Centre (2012) Black Poplar;
- Warwickshire Biological Records Centre (2001) Warwickshire Site of Importance for Nature Conservation: Wildlife Site Evaluation for Berkswell Marsh Meadow⁸²;
- Warwickshire Biological Records Centre (2008) Warwickshire Site of Importance for Nature Conservation: Wildlife Site Evaluation for Mouldings Green Farm⁸³;
- Warwickshire Biological Records Centre (2001) Warwickshire Site of Importance for Nature Conservation: Wildlife Site Evaluation for Denbigh Spinney⁸⁴;
- Warwickshire Biological Records Centre (2000) Warwickshire Site of Importance for Nature Conservation: Wildlife Site Evaluation for Coleshill Pool Wood⁸⁵;
- Warwickshire Biological Records Centre (2011) Local Wildlife Sites Evaluation Form: Patrick Farm Meadow⁸⁶;
- EcoRecord (2007) Review of Birmingham's Sites of Importance for Nature Conservation (SINC)s - Park Hall SINC⁸⁷;
- EcoRecord (2007) SINC Criteria Evaluation Form - Park Hall⁸⁸;
- EcoRecord (1997) Sunley Wildlife Fund Survey - Park Hall Wood⁸⁹;
- EcoRecord (1989) Birmingham Local Site Survey - Land at Warren Road⁹⁰;
- Amey (2011) MAC 9 Outfall Surveys Phase 1 Habitat Survey - Site 5⁹¹;
- Halcrow (2005) Supporting Information (Ecological Assessment) for the Outline Planning Application at the former Alstrom Site, Washwood Heath, Birmingham⁹²;
- Middlemarch Environmental Ltd. (2011) Park Farm, Middle Bickenhill -

⁸¹ Warwickshire Biological Records Centre; Warwickshire Museum; <http://heritage.warwickshire.gov.uk/ecology/data-and-ecological-records/warwickshire-biological-records-centre/>; contacted April 2012

⁸² Warwickshire Biological Records Centre (2001) Warwickshire Site of Importance for Nature Conservation: Wildlife Site Evaluation for Berkswell Marsh Meadow

⁸³ Warwickshire Biological Records Centre (2008) Warwickshire Site of Importance for Nature Conservation: Wildlife Site Evaluation for Mouldings Green Farm

⁸⁴ Warwickshire Biological Records Centre (2001) Warwickshire Site of Importance for Nature Conservation: Wildlife Site Evaluation for Denbigh Spinney

⁸⁵ Warwickshire Biological Records Centre (2000) Warwickshire Site of Importance for Nature Conservation: Wildlife Site Evaluation for Coleshill Pool Wood

⁸⁶ Warwickshire Biological Records Centre (2011) Local Wildlife Sites Evaluation Form: Patrick Farm Meadow

⁸⁷ EcoRecord (2007) Review of Birmingham's Sites of Importance for Nature Conservation (SINC)s - Park Hall SINC

⁸⁸ EcoRecord (2007) SINC Criteria Evaluation Form - Park Hall

⁸⁹ EcoRecord (1997) Sunley Wildlife Fund Survey - Park Hall Wood

⁹⁰ EcoRecord (1989) Birmingham Local Site Survey - Land at Warren Road

⁹¹ Amey (2011) MAC 9 Outfall Surveys Phase 1 Habitat Survey - Site 5

⁹² Halcrow (2005) Supporting Information (Ecological Assessment) for the Outline Planning Application at the former Alstrom Site, Washwood Heath, Birmingham

Extended Phase 1 Habitat Survey⁹³;

- Halletec Associates (2006) Meriden Quarry - Environmental Statement⁹⁴; and
- Apted S.M., Davies B. and Burgoine M. (1987) Plants found along the River Blythe between Mouldings Green Farm, Patrick Bridge, and Packhorse Bridge⁹⁵.

4.3 Deviations, constraints and limitations

- 4.3.1 Phase 1 Habitat Surveys carried out in 2013 commenced at the end of March, rather than the beginning of April (as stated in the draft methodology), but this is not considered to be significant, given the nature of the habitats being surveyed. It is considered that no habitats of significance were missed.
- 4.3.2 Access was not available to all land parcels. The main areas where field surveys were not possible were around Berkswell Marsh SSSI in the Balsall Common and Hampton-in-Arden area (CFA23).
- 4.3.3 Professional judgement and the use of aerial photography and desk study data was used to map habitats present on sites beyond 250m from the land required for the construction of the Proposed Scheme, or on sites where access was not available.
- 4.3.4 The limitations of mapping habitats from aerial photography resulted in a reduced level of interpretation. Consequently broad-leaved woodlands were mapped as broad-leaved semi-natural woodland, hedgerows were mapped as intact or defunct species-poor hedgerows, and semi-improved or improved grasslands were mapped as improved grassland.

4.4 Baseline

- 4.4.1 Phase 1 Habitat mapping of all four study areas can be found in Map series EC -02 (1:5,000) and EC-03 (1:2,500) (Volume 5, Map Book Ecology). Habitat descriptions can be cross referenced with the NVC survey results detailed in Section 5.

Woodland

- 4.4.2 Broad-leaved semi-natural woodland was found within the land required for the construction of the Proposed Scheme in the Balsall Common and Hampton-in-Arden area (CFA23), the Birmingham Interchange and Chelmsley Wood area (CFA24) and the Castle Bromwich and Bromford area (CFA25). Canopy species typically included abundant ash (*Fraxinus excelsior*) and oak (*Quercus robur*), with occasional crack willow (*Salix fragilis*), elder (*Sambucus nigra*), hawthorn (*Crataegus monogyna*), blackthorn (*Prunus spinosa*) sycamore (*Acer pseudoplatanus*), horse chestnut (*Aesculus hippocastanum*), sweet chestnut (*Castanea sativa*), silver birch (*Betula pendula*), hazel (*Corylus avellana*), dogwood (*Cornus sanguinea*), beech (*Fagus sylvatica*), field maple (*Acer campestre*), holly (*Ilex aquifolium*), rowan (*Sorbus aucuparia*), yew (*Taxus*

⁹³ Middlemarch Environmental Ltd. (2011) Park Farm, Middle Bickenhill - Extended Phase 1 Habitat Survey

⁹⁴ Halletec Associates (2006) Meriden Quarry - Environmental Statement

⁹⁵ Apted S.M., Davies B. and Burgoine M. (1987) Plants found along the River Blythe between Mouldings Green Farm, Patrick Bridge, and Packhorse Bridge

baccata), rose (*Rosa sp.*) and elm (*Ulmus sp.*). The ground flora was typically dominated by bramble (*Rubus fruticosus* agg.), common nettle (*Urtica dioica*), ivy (*Hedera helix*) and cleavers (*Galium aparine*). Also present were locally dominant patches of wood anemone (*Anemone nemorosa*), male fern (*Dryopteris filix-mas*), wood avens (*Geum urbanum*), bluebell, honeysuckle (*Lonicera periclymenum*), wood sorrel (*Oxalis acetosella*) and stitchwort (*Stellaria sp.*).

- 4.4.3 Broad-leaved plantation woodland was found within the land required for the construction of the Proposed Scheme in all four study areas. Canopy species of plantation woodland were typically dominated by sycamore and ash, with locally abundant sweet chestnut, frequent hawthorn and hazel and occasional beech, silver birch, dog rose (*Rosa canina* agg.) and blackthorn.
- 4.4.4 Coniferous plantation woodland was found within the land required for the construction of the Proposed Scheme in the Castle Bromwich and Bromford area (CFA25) and the Washwood Heath to Curzon Street area (CFA26).
- 4.4.5 Mixed plantation woodland, containing both coniferous and broad-leaved species was found within the land required for the construction of the Proposed Scheme in the Balsall Common and Hampton-in-Arden area (CFA23), the Birmingham Interchange and Chelmsley Wood area (CFA24) and the Castle Bromwich and Bromford area (CFA25).

Balsall Common and Hampton-in-Arden area (CFA23)

- 4.4.6 The broad-leaved semi-natural woodland parcels which fell within the land required for the construction of the Proposed Scheme were located along the disused rail line at the south end of the Balsall Common and Hampton-in-Arden area (CFA23), to the north-west of The Roughs and north of Lodge Farm, and there was a small strip of woodland on the south side of Shadow Brook. Mixed semi-natural woodland was found east of Berkswell station.
- 4.4.7 There was broad-leaved plantation woodland found within the land required for the construction of the Proposed Scheme around the land west of The Roughs and north of Lodge Farm, land south of The Roughs and south of Berkswell Marsh SSSI. There had been selective felling at the land west of The Roughs and north of Lodge Farm, with replanting of native broad-leaved species.

Birmingham Interchange and Chelmsley Wood area (CFA24)

- 4.4.8 Semi-natural woodland occurred mainly in linear belts alongside infrastructure, watercourses or in redundant field corners. The largest parcels of semi-natural woodland were found at:
- Hollywell Brook south of Park Farm;
 - Denbigh Spinney Local Wildlife Site (LWS);
 - Coleshill Pool Wood LWS, west of Coleshill & Bannerly Pools SSSI; and
 - Coleshill & Bannerly Pools SSSI.

- 4.4.9 The woodland adjacent to Hollywell Brook contained frequent oak and ash, with areas of wet woodland where willow and alder were locally frequent. The woodland east of Park Farm was an oak dominated open woodland habitat. Denbigh Spinney LWS was an alder and birch wet woodland, with drier areas, which represented a relatively unusual habitat for Warwickshire. The strip of land between the A446 Stonebridge Road and A452 Chester Road was made up of immature birch woodland. Coleshill Wood LWS and Coleshill & Bannerly Pools SSSI were acidic birch oak woodlands with variable proportions of oak to birch.
- 4.4.10 Plantation woodland was found within the island at the M42/A446 Stonebridge Road junction and immediately to the south of this.

Castle Bromwich and Bromford area (CFA25)

- 4.4.11 The broad-leaved semi-natural woodlands within the land required for the construction of the Proposed Scheme all fell within Park Hall SIN. All three woods displayed characteristics of ancient woodland, despite only one block being registered on the Ancient Woodland Inventory. Small areas of wet woodland were also present and were associated with locations of historic meanders of the River Tame SLINC. This wet woodland habitat was dominated by crack willow.

Washwood Heath to Curzon Street area (CFA26)

- 4.4.12 There was no semi-natural woodland which fell within the land required for the construction of the Proposed Scheme and only small amounts of plantation woodland were found alongside the River Tame SLINC and Grand Union Canal SLINC. These were dominated by birch.
- 4.4.13 Broad-leaved semi-natural woodland and mixed semi-natural woodland within the Balsall Common and Hampton-in-Arden area (CFA23), the Birmingham Interchange and Chelmsley Wood area (CFA24) and Castle Bromwich and Bromford area (CFA25) were classified as habitats of principal importance under the category of lowland mixed deciduous woodland. Within the Phase 1 Habitat classification of semi-natural woodland, there were also areas of wet woodland within the Balsall Common and Hampton-in-Arden area (CFA23), the Birmingham Interchange and Chelmsley Wood area (CFA24) and the Castle Bromwich and Bromford area (CFA25) which is classified as a habitat of principal importance within their own right. Plantation woodland is not a habitat of principal importance.
- 4.4.14 Areas of woodland which fell within the land required for the construction of the Proposed Scheme are given in Table 7.

Table 7: Areas of woodland (hectares) found within the land required for the construction of the Proposed Scheme

CFA	23	24	25	26
Broad-leaved semi-natural woodland	6.8	22.4	4.7	0
Mixed semi-natural woodland	0.8	0	0	0
Broad-leaved plantation woodland	1.6	4.6	0.7	0.1
Coniferous plantation woodland	0	0	0	0

CFA	23	24	25	26
Mixed plantation woodland	3.9	0.9	0	0

Scrub

4.4.15 Dense and/or scattered scrub was found within all four study areas. This scrub was typically dominated by hawthorn and bramble, with frequent species such as blackthorn and elder and occasional species such as goat willow (*Salix caprea*). Other species included butterfly bush (*Buddleja davidii*), silver birch, field maple, hazel, ash saplings, dog rose and rowan.

4.4.16 Scrub is not a habitat of principal importance.

Hedgerows

4.4.17 Hedgerows were found within all four study areas. For detailed information on hedgerows, see Section 8.

4.4.18 Hedgerows within the Balsall Common and Hampton-in-Arden area (CFA23) and the Birmingham Interchange and Chelmsley Wood area (CFA24) were typically dominated by hawthorn and blackthorn, and included other woody species such as holly, hazel, honeysuckle, ivy, bramble, ash, field maple, sycamore, dogwood, hazel, oak, field rose (*Rosa arvensis*), dog rose, elder, goat willow and English elm (*Ulmus procera*).

4.4.19 Hedgerows within the Balsall Common and Hampton-in-Arden area (CFA23) were typically more species rich than in the Birmingham Interchange and Chelmsley Wood area (CFA24) with frequent mature ash or oak standards, occasional field maple and elm standards and a diverse ground flora.

4.4.20 Hedgerows within the urban areas in the Castle Bromwich and Bromford area (CFA25) and the Washwood Heath to Curzon Street area (CFA26) typically contained some ornamental plant species such as cotoneaster (*Cotoneaster sp.*), pyracantha (*Pyracantha sp.*) and leylandii (*Leylandii sp.*) and lacked ground floral diversity.

4.4.21 All hedgerows consisting predominantly of at least one woody UK native species are habitats of principal importance; therefore the majority of hedgerows within the land required for the construction of the Proposed Scheme represented habitats of principal importance.

4.4.22 Lengths of hedgerow which fell within the land required for the construction of the Proposed Scheme are given in Table 8.

Table 8: Lengths of hedgerows (m) found within the land required for the construction of the Proposed Scheme

CFA	23	24	25	26
Native species-rich intact hedge	858.3	288.6	0	166.3
Native species-rich hedge and trees	4721.1	3341.7	0	60.7
Species-poor intact hedge	3741.4	3919.6	31.8	200.7
Species-poor defunct hedge	255.7	1603.9	385.2	0
Species-poor hedge and trees	7877.3	6436.34	0	308.1

Parkland and scattered trees

- 4.4.23 Broad-leaved scattered trees were found within all four study areas. The majority of these trees, particularly in Warwickshire (CFA23 and 24) consisted of ash and pendunculate oak. Other scattered trees comprised apple (*Malus sp.*), crab apple (*Malus sylvestris*), Western balsam-poplar (*Populus trichocarpa*), sycamore, goat willow, crack willow, weeping willow (*Salix babylonica*), silver birch, sweet chestnut, hazel, alder, cherry (*Prunus sp.*), plum (*Prunus sp.*), yew, rowan and elder. Desk study data did not show any records of veteran trees within the land required for the construction of the Proposed Scheme in the Balsall Common and Hampton-in-Arden area (CFA23) and the Birmingham Interchange and Chelmsley Wood area (CFA24)⁹⁶.
- 4.4.24 The broad-leaved scattered trees found within the land required for the construction of the Proposed Scheme did not qualify as habitats of principal importance.

Grassland and marsh

- 4.4.25 Semi-improved neutral grassland was found within all four study areas. This grassland type typically contained one or more grass species such as smooth meadow-grass (*Poa pratensis*), rough meadow-grass (*Poa trivialis*), annual meadow-grass (*Poa annua*), Timothy (*Phleum pratense*), cock's-foot (*Dactylis glomerata*), Yorkshire fog (*Holcus lanatus*), common bent (*Agrostis capillaris*), creeping bent (*Agrostis stolonifera*), common couch (*Elytrigia repens*), red fescue (*Festuca rubra*), meadow foxtail (*Alopecurus pratensis*), sweet vernal grass (*Anthoxanthum odoratum*), crested dog's-tail (*Cynosurus cristatus*) and perennial rye-grass (*Lolium perenne*). Herb species included yarrow (*Achillea millefolium*), meadow buttercup (*Ranunculus acris*), selfheal (*Prunella vulgaris*), meadow vetchling (*Lathyrus pratensis*), red bartsia, common mouse-ear (*Cerastium fontanum*), broad-leaf plantain (*Plantago major*), ribwort plantain (*Plantago lanceolata*), creeping cinquefoil (*Potentilla reptans*), great burnet, tansy (*Tanacetum vulgare*), red clover (*Trifolium pratense*), white clover (*Trifolium repens*), dandelion (*Taraxacum officinale* agg.), common nettle, bird's-foot trefoil (*Lotus corniculatus*), pineappleweed (*Matricaria discoidea*), scentless mayweed (*Matricaria perforata*), black medick (*Medicago lupulina*), tormentil (*Potentilla erecta*) and docks (*Rumex spp.*).
- 4.4.26 Improved grassland was found within all four study areas. This grassland typically included abundant common bent, perennial rye-grass and smooth meadow-grass with frequent daisy (*Bellis perennis*), black medick, creeping buttercup (*Ranunculus repens*), broad-leaved dock (*Rumex obtusifolius*), white clover and dandelion.
- 4.4.27 Amenity grassland was found within all four study areas. This habitat is typically dominated by perennial rye-grass and white clover, with frequent dandelion, broad-leaf plantain and daisy.
- 4.4.28 Marshy grassland was found within the land required for the construction of the Proposed Scheme in the Balsall Common and Hampton-in-Arden area (CFA23), the Birmingham Interchange and Chelmsley Wood area (CFA24) and the Castle Bromwich

⁹⁶ Data on veteran trees within the Castle Bromwich and Bromford area (CFA25) and Washwood Heath to Curzon Street area (CFA26) was not available.

and Bromford area (CFA25). The marshy grassland typically contained abundant soft-rush (*Juncus effusus*) and hard rush (*Juncus inflexus*), lesser pond sedge (*Carex acutiformis*), hairy sedge (*Carex hirta*) and greater pond sedge (*C. riparia*) and marsh herbs such as meadowsweet (*Filipendula ulmaria*), rosebay willowherb (*Chamerion angustifolium*), great willowherb (*Epilobium hirsutum*), marsh willowherb (*Epilobium palustre*), hoary willowherb (*Epilobium parviflorum*), musk mallow (*Malva moschata*), common mallow (*Malva sylvestris*), creeping buttercup and docks. Angelica (*Angelica sylvestris*), wavy bitter-cress (*Cardamine flexuosa*), creeping thistle (*Cirsium arvense*), marsh thistle (*Cirsium palustre*), common mouse-ear, common nettle, iris (*Iris sp.*), marsh marigold (*Caltha palustris*) broad-leaved dock, water chickweed (*Myosoton aquaticum*) and bog stitchwort (*Stellaria alsine*) were also frequent.

Balsall Common and Hampton-in-Arden area (CFA23)

4.4.29 Semi-improved neutral grassland was found within the land required for the construction of the Proposed Scheme. Potentially species rich areas were located south of Beechwood Farm, at Lavender Hall Farm, at the land north-west of Berkswell Marsh SSSI, at Mouldings Green Farm, Hampton-in-Arden LWS and within the field on the corner of the B4102 Meriden Road and Diddington Lane.

4.4.30 The majority of marshy grassland which fell within the land required for the construction of the Proposed Scheme was found west of Berkswell Marsh SSSI and beside the River Blythe SSSI at Mouldings Green Farm, Hampton-in-Arden LWS.

Birmingham Interchange and Chelmsley Wood area (CFA24)

4.4.31 Semi-improved neutral grassland was found within the land required for the construction of the Proposed Scheme. Species rich areas were located south of Park Farm, at the M42 / A452 Chester Road island and at verges just south of Coleshill & Bannerly Pools SSSI.

4.4.32 The majority of marshy grassland which fell within the land required for the construction of the Proposed Scheme was found immediately north of the A45 on both sides of Hollywell Brook, on both sides of the channel which fed into Hollywell Brook and to the east of the River Blythe SSSI just north of the Stonebridge island.

Castle Bromwich and Bromford area (CFA25)

4.4.33 Semi-improved neutral grassland was found within the land required for the construction of the Proposed Scheme in the eastern part of the area. Parts of the field at the east end of Park Hall SINC were species rich, although it was difficult to identify species due to heavy grazing and further areas of semi-improved neutral grasslands were present further west within Park Hall SINC. Of these, some appeared to be species diverse dominated by red fescue, with abundant meadow foxtail, cuckooflower (*Cardamine pratensis*), self-heal, ribwort plantain, hairy sedge, red bartsia and meadow buttercup.

4.4.34 The majority of marshy grassland which fell within the land required for the construction of the Proposed Scheme was found at Park Hall SINC. Many areas of the marsh were dominated by lesser pond sedge and rushes.

Washwood Heath to Curzon Street area (CFA26)

- 4.4.35 In comparison to the other three study areas, there was relatively little semi-improved neutral grassland within the land required for the construction of the Proposed Scheme in the Washwood Heath to Curzon Street area (CFA26). A small area of species-rich grassland was found around Nechells Gas Holders.
- 4.4.36 Areas of semi-improved acid grassland were found within the Washwood Heath to Curzon Street area (CFA26), along the southern edge of Washwood Heath Rolling Stock and Maintenance depot, which is an uncommon habitat within Birmingham and the Black Country. The grassland is dominated by Wavy hair-grass and other species present within this habitat include common bent, common couch, false oat-grass (*Arrhenatherum elatius*) and cock's-foot. The grassland became less acidic in areas towards the top of the bank, and was being encroached by scrub in places.
- 4.4.37 The meadow at Patrick Farm Meadow LWS and at Mouldings Green Farm, Hampton-in-Arden LWS, located within the Balsall Common and Hampton-in-Arden area (CFA23) and the narrow field that ran parallel to the channel which fed into Hollywell Brook within the Birmingham Interchange and Chelmsley Wood area (CFA24) are classified as lowland meadow and are therefore habitats of principal importance. The acid grassland at Washwood Heath Rolling Stock and Maintenance depot is also classified as a habitat of principal importance. Improved grassland, amenity grassland, marshy grassland and the majority of poor semi-improved grassland within the land required for the construction of the Proposed Scheme are not classified as habitats of principal importance.
- 4.4.38 Areas of grassland which fell within the land required for the construction of the Proposed Scheme are given in Table 9.

Table 9: Areas of grassland (hectares) found within the land required for the construction of the Proposed Scheme

CFA	23	24	25	26
Semi-improved grassland	18.2	2.0	18.1	0.6
Species-poor semi-improved grassland	23.6	59.3	13.3	2.0
Semi-improved acid grassland	0	0	0	0.8
Improved grassland	27.4	5.8	2.7	0.8
Amenity grassland	1.4	10.9	6.5	3.8
Marshy Grassland	2.6	4.7	3.2	0

Wetlands

- 4.4.39 Small areas of swamp habitats were found within the land required for the construction of the Proposed Scheme in the Balsall Common and Hampton-in-Arden area (CFA23) at Lavender Hall Fisheries and in the Castle Bromwich and Bromford area (CFA25) around the ponds at Park Hall SINC. These were typically dominated by stands of bulrush (*Typha latifolia*), common reed (*Phragmites australis*) and reed canary-grass (*Phalaris arundinacea*).

- 4.4.40 Marginal and/or inundation vegetation was found at the edges of many water bodies and watercourses within all four study areas, and included species such as angelica, fool's-water-cress (*Apium nodiflorum*), brooklime (*Veronica beccabunga*), lesser pond sedge, greater pond sedge, pendulous sedge (*Carex pendula*), water mannagrass (*Glyceria fluitans*), water mint (*Mentha aquatica*), hemlock water-dropwort (*Oenanthe crocata*), reed canary-grass, water cress (*Nasturtium officinale*), water figwort (*Scrophularia auriculata*), water dock (*Rumex hydrolapathum*) and branched bur-reed (*Sparganium erectum*). Indian balsam was found within all four areas and is summarised in Section 3.
- 4.4.41 Although there was no fen habitat which fell within the land required for the construction of the Proposed Scheme, the fen habitat at Coleshill & Bannerly Pools SSSI in the Birmingham Interchange and Chelmsley Wood area(CFA24), lay immediately adjacent to this. This is a remnant of valley mire fen over peat⁹⁷.
- 4.4.42 All reed beds found within swamp habitats within the land required for the construction of the Proposed Scheme are habitats of principal importance. The valley mire fen at Coleshill & Bannerly Pools SSSI qualifies as lowland fen and is therefore also classified as a habitat of principal importance. Marginal vegetation and inundation vegetation were not habitats of principal importance.
- 4.4.43 Areas of wetland which fell within the land required for the construction of the Proposed Scheme are given in Table 10.

Table 10: Areas of wetland (hectares) found within the land required for the construction of the Proposed Scheme

CFA	23	24	25	26
Swamp (ha)	Less than 0.1	0	1.4	0
Inundation vegetation (ha)	Less than 0.1	Less than 0.1	0	0

Watercourses

- 4.4.44 Watercourses were found within all four study areas.

Balsall Common and Hampton-in-Arden area (CFA23)

- 4.4.45 The River Blythe SSSI and its tributaries (Bayleys Brook and Shadow Brook) run through the land required for the construction of the Proposed Scheme. These watercourses tended to support a variety of marginal vegetation, and the River Blythe SSSI supported water crowfoot species (*Ranunculus sp.*). More detail on watercourses can be found in Section 6 and Section 7 of this report.

Birmingham Interchange and Chelmsley Wood area (CFA24)

- 4.4.46 Hollywell Brook, a tributary to the River Blythe SSSI, runs through the land required for the construction of the Proposed Scheme. These watercourses tended to support a variety of marginal vegetation such as sedges.

⁹⁷ Natural England (2008) Citation for Coleshill & Bannerly Pools SSSI⁹⁷;

Castle Bromwich and Bromford area (CFA25)

- 4.4.47 The main watercourse is the River Tame SLINC and tributaries to the River Tame SLINC include the Overflow Channel and Plants Brook. The River Tame SLINC supported extensive areas of river water-crowfoot species and fennel pondweed (*Potamogeton pectinatus*). Overflow Channel had extensive areas of the invasive species Nuttall's waterweed (*Elodea nuttallii*).

Washwood Heath to Curzon Street area (CFA26)

- 4.4.48 The main watercourses which fall within the land required for the construction of the Proposed Scheme were the River Rea, the River Tame SLINC, the Grand Union Canal SLINC and the Digbeth Branch Canal SLINC. There was limited aquatic vegetation within the urban parts of these watercourses.
- 4.4.49 All natural and near natural running waters are habitats of principal importance; therefore all watercourses which flowed through the land required for the construction of the land required for the construction of the Proposed Scheme in the Balsall Common and Hampton-in-Arden area (CFA23), Birmingham Interchange and Chelmsley area (CFA24) and the Castle Bromwich and Bromford area (CFA25) were classified as habitats of principal importance. The canals within the Washwood Heath to Curzon Street area (CFA26) were not habitats of principal importance.
- 4.4.50 Lengths of watercourse which fell within the land required for the construction of the Proposed Scheme are given in Table 11.

Table 11: Lengths of watercourse (km and hectares) found within the land required for the construction of the Proposed Scheme

CFA	23	24	25	26
Watercourse (km)	4.9	3.0	2.4	2.8

Water bodies

- 4.4.51 Water bodies are found within all four study areas. These vary in type and include ornamental garden ponds, man-made ponds dug into the flood-plain, ephemeral pools, field ponds and small lakes. Details of pond surveys can be found in Section 10 and details on notable plants recorded can be found in Section 3.

Balsall Common and Hampton-in-Arden area (CFA23)

- 4.4.52 The ponds within the land required for the construction of the Proposed Scheme were all field ponds, with the exception of one fishing pond at Lavender Hall Fisheries.

Birmingham Interchange and Chelmsley Wood area (CFA24)

- 4.4.53 The ponds within the land required for the construction of the Proposed Scheme comprise field ponds, Pendigo Lake, an ornamental pond to the west of Pendigo Lake and a cluster of man-made ponds just west of Denbigh Spinney LWS, which are located within a motorcycle scramble circuit.

Castle Bromwich and Bromford area (CFA25)

- 4.4.54 Almost all ponds which fell within the land required for the construction of the Proposed Scheme are found within Park Hall SINC, the majority of which sit within the

floodplain of the River Tame SLINC. Water bodies within Park Hall SINC consist of field ponds, drainage ditches, ephemeral pools and newly dug ditches and ponds, which are part of a habitat creation initiative for amphibians and invertebrates. The large pool at Park Hall SINC is a remnant meander of the River Tame SLINC, and was formed when the River Tame SLINC was straightened. One pond falls within the land required for the construction of the Proposed Scheme at the land north of Park Hall SINC, and forms part of an old sewage treatment works.

Washwood Heath to Curzon Street area (CFA26)

- 4.4.55 All ponds which fall within the land required for the construction of the Proposed Scheme are concrete lined.
- 4.4.56 A number of ponds within the land required for the construction of the Proposed Scheme will qualify as habitats of principal importance because they either support Red Data Book species, species of principal importance or species fully protected under the Wildlife and Countryside Act 1981 (as amended), or were classified within the top PSYM category⁹⁸.
- 4.4.57 The number of water bodies which fall within the land required for the construction of the Proposed Scheme are listed in Table 12.

Table 12: Number of water bodies found within the land required for the construction of the Proposed Scheme

CFA	23	24	25	26
Number of water bodies	11	26	19	2

Tall herb and fern

- 4.4.58 Tall ruderal herbs were found within all four study areas. Tall ruderal vegetation is typically dominated by rosebay willowherb, great willowherb, creeping thistle, common ragwort (*Senecio jacobaea*), common nettle, cow parsley (*Anthriscus sylvestris*), common knapweed (*Centaurea nigra*) and broad-leaved dock with frequent red campion (*Silene dioica*), false oat-grass, cock's-foot and hogweed (*Heracleum sphondylium*) and occasional dead-nettle species (*Lamium sp.*), hedge parsley (*Torilis arvensis*), ox-eye daisy (*Leucanthemum vulgare*) and smooth hawk's-beard (*Crepis capillaris*). Spear thistle (*Cirsium vulgare*), foxglove (*Digitalis sp.*), greater burnet, broad-leaved willowherb (*Epilobium montanum*), field forget-me-not (*Myosotis arvensis*), bistort (*Persicaria bistorta*), green alkanet (*Pentaglottis sempervirens*), agrimony (*Agrimonia eupatoria*), soft brome (*Bromus hordeaceus*), barren brome (*Anisantha sterilis*), meadow foxtail, creeping soft-grass (*Holcus mollis*) and Timothy also occur rarely within this habitat type. Japanese knotweed was found within all four areas.
- 4.4.59 Continuous and scattered bracken was found within the Balsall Common and Hampton-in-Arden area (CFA23) and the Washwood Heath to Curzon Street area (CFA26).
- 4.4.60 Tall ruderal vegetation and bracken are not habitats of principal importance.

⁹⁸ BRIG (ed. Maddock A.) (2011) UK Biodiversity Action Plan Priority Habitat Descriptions

- 4.4.61 Areas of tall ruderal vegetation and bracken which fell within the land required for the construction of the Proposed Scheme are given in Table 13.

Table 13: Areas of tall herb and fern (hectares) found within the land required for the construction of the Proposed Scheme

CFA	23	24	25	26
Tall ruderal	4.0	7.7	4.9	3.6
Continuous and scattered bracken	0	Less than 0.1	0	Less than 0.1

Ephemeral/short perennial

- 4.4.62 Ephemeral/short perennial vegetation was found within all four areas. Plant species found within this habitat typically include daisy, sticky mouse-ear (*Cerastium glomeratum*), Canadian fleabane (*Conyza canadensis*), scarlet pimpernel (*Anagallis arvensis*), yarrow, pineappleweed, field forget-me-not, redshank (*Persicaria maculosa*), broadleaf plantain, ribwort plantain, annual meadow-grass, creeping buttercup, common ragwort, prickly sowthistle (*Sonchus asper*), tansy, dandelion, scentless mayweed (*Tripleurospermum inodorum*) and common speedwell (*Veronica arvensis*). Large-flowered evening-primrose (*Oenothera glazioviana*) has also been found in this habitat.
- 4.4.63 Some ephemeral/short perennial vegetation growing on a demolition site, within the Washwood Heath to Curzon Street area (CFA26), just east of Washwood Heath qualifies as open mosaic habitats on previously developed land. This is a habitat of principal importance.
- 4.4.64 Areas of ephemeral / short perennial habitat which fell within the land required for the construction of the Proposed Scheme are given in Table 14.

Table 14: Areas of ephemeral/short perennial vegetation (hectares) found within the land required for the construction of the Proposed Scheme

CFA	23	24	25	26
Ephemeral/short perennial	0.6	0.7	Less than 0.1	2.0

Arable/cultivated land

- 4.4.65 Arable/cultivated land was found within the land required for the construction of the Proposed Scheme in the Balsall Common and Hampton-in-Arden area (CFA23) and the Birmingham Interchange and Chelmsley Wood (CFA24). This typically was under cereals such as wheat (*Triticum sp.*), barley (*Hordeum spp.*) and Rapeseed (*Brassica napus*).
- 4.4.66 Arable land does not qualify as a habitat of principal importance. Arable field margins do qualify as habitats of principal importance if they are managed specifically to provide benefits to wildlife. The only field margin which fell within the land required for the construction of the Proposed Scheme and which qualified as a habitat of principal importance were the northern and western margins of the arable field within Marsh Lane Nature Reserve within the Balsall Common and Hampton-in-Arden area (CFA23).

4.4.67 Areas of arable land which fell within the land required for the construction of the Proposed Scheme are given in Table 15.

Table 15: Areas of arable field (hectares) found within the land required for the construction of the Proposed Scheme

CFA	23	24	25	26
Arable	137.7	118.0	0	0

Buildings/structures

4.4.68 Buildings and structures were found within all four areas. Within the rural areas these mainly comprised residential buildings and farm buildings, and within the urban areas these mainly comprised residential buildings and industrial buildings.

4.4.69 Buildings are not habitats of principal importance.

Other habitats

4.4.70 Introduced shrub was found within all four areas. The majority of the shrub comprised various cotoneasters, firethorn, barberry (*Berberis* sp.), butterfly bush, hebe (*hebe* sp.), garden lavender (*Lavandula angustifolia*), *leylandii*, Oregon grape (*Mahonia* sp.) and rhododendron (*Rhododendron* sp.).

4.4.71 Most of the introduced shrub was found in the vicinity of residential properties and within gardens. Within the Castle Bromwich and Bromford area (CFA25) and the Washwood Heath to Curzon Street area (CFA26), ornamental planting had been used to screen industrial sites and landscape car parks. Some of these ornamental plants were listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended).

4.4.72 Bare ground was found within the land required for the construction of the Proposed Scheme in all four areas. The majority of bare ground was found within the Washwood Heath to Curzon Street area (CFA26), where a large area of previously developed land had recently been cleared, just east of Washwood Heath.

4.4.73 Spoil heaps were found within the land required for the construction of the Proposed Scheme in the Balsall Common and Hampton-in-Arden area (CFA23), Birmingham Interchange and Chelmsley area (CFA24) and the Castle Bromwich and Bromford area (CFA25).

4.4.74 Introduced shrub, bare ground, spoil, refuse tips, quarries, fences, dry ditches and walls which fell within the land required for the construction of the Proposed Scheme are not habitats of principal importance.

5 National Vegetation Classification

5.1 Introduction

- 5.1.1 This section of the appendix details National Vegetation Classification⁹⁹ (NVC) baseline data relevant to the section of the Proposed Scheme that will pass through CFA23, CFA24, CFA25 and CFA26.

5.2 Methodology

- 5.2.1 Details of the standard methodology used for NVC surveys are provided in Ecology technical note: Ecological field survey methods and standards (Volume 5: Appendix CT-001-000/2).

- 5.2.2 Sites were selected for NVC survey based on review of the following desk study and field survey information:

- location of statutory and non-statutory designated sites and associated citation sheets received from Warwickshire Biological Record Centre, EcoRecord and Natural England;
- location of NERC Act ¹⁰⁰ s41 Habitats of Principal Importance based on the historical UK BAP habitat inventories;
- location of protected and notable plant records;
- Phase 1 Habitat Survey data supplied for the County of Warwickshire¹⁰¹;
- Phase 1 Habitat Survey data;
- River Corridor Survey data; and
- locations of historic and recent landfill sites.
- Aspinwall and Company (1995) NRA (Severn Trent Region) Hydrogeological Assessment of Sites of Special Scientific Interest. Final Report: Berkswell Marsh, SP 228 798, West Midlands¹⁰²;
- Aspinwall and Company (1995) NRA (Severn Trent Region) Hydrogeological Assessment of Sites of Special Scientific Interest. Final Report: Coleshill and Bannerly Pools, SP 200 860, Warwickshire¹⁰³;
- Bennett, S. to Cooper V. (1997) Coleshill and Bannerly Pools. Letter regarding

⁹⁹ NVC is a detailed survey and classification system that is used to compare plant communities with a range of defined community types.

¹⁰⁰ The National Archives; Natural Environment and Rural Communities Act 2006; <http://www.legislation.gov.uk/ukpga/2006/16/contents>; accessed 15 January 2013

¹⁰¹ Warwickshire Biological Records Centre; Warwickshire Museum; <http://heritage.warwickshire.gov.uk/ecology/data-and-ecological-records/warwickshire-biological-records-centre/>; contacted April 2012

¹⁰² Aspinwall and Company (1995) NRA (Severn Trent Region) Hydrogeological Assessment of Sites of Special Scientific Interest. Final Report: Berkswell Marsh, SP 228 798, West Midlands

¹⁰³ Aspinwall and Company (1995) NRA (Severn Trent Region) Hydrogeological Assessment of Sites of Special Scientific Interest. Final Report: Coleshill and Bannerly Pools, SP 200 860, Warwickshire

hydrological connections to the SSSI¹⁰⁴;

- Walker, C. (1994) Berkswell Marsh, West Midland: Results of NVC Survey. Natural England¹⁰⁵;
- Whitbread, A. (1985) Coleshill & Bannerly Pools SSSI: Phase 1 Habitat Survey Results¹⁰⁶;
- Greenfield Associates (2011). Environmental Statement: Park Farm, Middle Bickenhill, Near Solihull, Birmingham¹⁰⁷;
- Middlemarch Environmental Ltd. (2011) Park Farm, Middle Bickenhill - Extended Phase 1 Habitat Survey¹⁰⁸;
- Meriden Quarry Extension, Environmental Statement (2006): Summary pages (11 and 12)¹⁰⁹;
- Argus Ecology (2011). Packington CHP Facility, Little Packington Landfill Site, Warwickshire. Extended Phase 1 Habitat Survey¹¹⁰;
- Halcrow (2005) Supporting Information (Ecological Assessment) for the Online Planning Application at the Former Alstom Site, Washwood Heath¹¹¹. Note: Further detail within ecology chapter identified as potentially containing NVC Survey data (Appendix 5) – not received or reviewed; and
- Amey (2011) MAC 9 Outfall Surveys, Phase 1 Habitat Survey - Site 5¹¹².

5.2.3 NVC community types were derived using keys¹¹³¹¹⁴.

5.2.4 Details of the locations where NVC surveys were conducted are provided in Table 16 and in accompanying Map series EC-10 (Volume 5, Map Book Ecology).

¹⁰⁴ Bennett, S. to Cooper V. (1997) Coleshill and Bannerly Pools. Letter regarding hydrological connections to the SSSI

¹⁰⁵ Walker, C. (1994) Berkswell Marsh, West Midland: Results of NVC Survey. Natural England

¹⁰⁶ Whitbread, A. (1985) Coleshill & Bannerly Pools SSSI: Phase 1 Habitat Survey Results

¹⁰⁷ Greenfield Associates (2011). Environmental Statement: Park Farm, Middle Bickenhill, Nr Solihull, Birmingham

¹⁰⁸ Middlemarch Environmental Ltd. (2011) Park Farm, Middle Bickenhill - Extended Phase 1 Habitat Survey

¹⁰⁹ Meriden Quarry Extension, Environmental Statement (2006): Summary pages (11 and 12)

¹¹⁰ Argus Ecology (2011). Packington CHP Facility, Little Packington Landfill Site, Warwickshire. Extended Phase 1 Habitat Survey

¹¹¹ Halcrow (2005) Supporting Information (Ecological Assessment) for the Online Planning Application at the Former Alstom Site, Washwood Heath.

¹¹² Amey (2011) MAC 9 Outfall Surveys, Phase 1 Habitat Survey - Site 5

¹¹³ Rodwell, J.S. (1991 et seq.). British Plant Communities (4 of 5 Volumes). Cambridge University Press:

Rodwell, J.S. (ed.) (1991) British Plant Communities. Volume 1. Woodlands and scrub. Cambridge University Press

Rodwell, J.S. (ed.) (1991) British Plant Communities. Volume 2. Mires and heath. Cambridge University Press

Rodwell, J.S. (ed.) (1992) British Plant Communities. Volume 3. Grassland and montane communities. Cambridge University Press

Rodwell, J.S. (ed.) (1995) British Plant Communities. Volume 4. Aquatic communities, swamps and tall-herb fens. Cambridge University Press

¹¹⁴ Rodwell, J.S. (2006) National Vegetation Classification: Users' Handbook. Joint Nature Conservation Committee

Table 16: Summary of NVC surveys undertaken within CFA23, CFA24, CFA25 and CFA26

Ecology survey code	NVC survey site name	Location	OS grid reference	Habitat types included in survey	Survey date	CFA	Distance from land required for the construction of the Proposed Scheme ¹¹⁵ (m) and orientation
040-PH2-148001	Beechwood Farm	Beechwood Farm – sloping field between active and disused rail corridor	SP 25415 27721	Grassland	10 May 2013	23	Within land required
040-PH2-149001	Ram Hall Farm	Either side of Lavender Hall embankment, Balsall Common	SP 24580 77811	Grassland	17 May 2013	23	Within land required
040-PH2-150001	Marlowes Grassland	Grassland north of A452 Kenilworth Road and Park Lane	SP 23230 78851	Grassland	17 May 2013	23	Within land required
040-PH2-151001	Marlowes Wood	Woodland north of A452 Kenilworth Road and Park Lane	SP 23353 79033	Woodland	08 May 2013	23	Within land required
040-PH2-152001	Sixteen Acre Wood	Woodland south of Berkswell Marsh SSSI	SP 22699 79663	Woodland	07 May 2013	23	Within land required
040-PH2-153001	Patrick Farm Meadow LWS	Patrick Farm Meadow LWS	SP 21736 80887	Grassland	21 May 2013	23	Within land required
040-PH2-153002	Gravel Pit Plantation	North of Hornbrook Farm	SP 22326 81431	Woodland	29 May 2013	23	10m, east
040-PH2-154001	Fields adjacent to River Blythe - Hampton Depot	Field east of Hampton-in-Arden	SP 21408 81645	Marshy grassland	21 May 2013	23	Within land required
040-PH2-154002	Mouldings Green Farm, Hampton-in-Arden LWS	Mouldings Green Farm, Hampton-in-Arden LWS	SP 21420 81741	Woodland Marshy grassland	16 May 2013	23	Within land required
040-PH2-156001	Hollywell Brook	West of Middle Bickenhill Lane	SP 20530 83645	Grassland Marshy grassland Swamp	14 May 2013; 16 May 2013	24	Within land required
040-PH2-156002	Hampton-in-Arden to Shustoke disused rail line	North and south of A452 Chester Road at Park Farm	SP 20760 83590	Scrub	08 May 2013	24	Within land required
040-PH2-156003	Sidings Wood	Woodland east of A452 Chester Road at Park Farm	SP 20897 83906	Woodland Grassland Marshy	08 May 2013	24	Within land required

¹¹⁵ The phrase 'Within land required' represents an abbreviation of this term

Ecology survey code	NVC survey site name	Location	OS grid reference	Habitat types included in survey	Survey date	CFA	Distance from land required for the construction of the Proposed Scheme ¹¹⁵ (m) and orientation
				grassland Scrub			
040-PH2-157001	Denbigh Spinney LWS	Denbigh Spinney, LWS	SP 20423 84327	Woodland Wet woodland	04 May 2013	24	Within land required
040-PH2-158001	Coleshill & Bannerly Pools SSSI (Coleshill Pool)	Coleshill & Bannerly Pools SSSI	SP 19905 85906	Woodland Wet woodland Mire	09 May 2013; 22 May 2013	24	Within land required
040-PH2-158002	Coleshill Pool Wood LWS	Coleshill Pool Wood LWS	SP 19442 86266	Woodland Wet woodland	23 May 2013	24	Within land required
040-PH2-165001	Parkhall Wood	Parkhall Wood, part of Park Hall SINC	SP 16364 90989	Woodland	01 June 2012	25	Within land required
040-PH2-165002	Grassland between Parkhall Wood and Birmingham and Derby rail line	Park Hall SINC	SP 16232 91018	Marshy grassland	15 May 2013	25	Within land required
040-PH2-165003	Field adjacent to B4118 Birmingham Road and Parkhall Wood	Land on the north-west side of B4118 Birmingham Road	SP 16177 90940	Grassland	16 May 2013	25	Within land required
040-PH2-165004	Wet and dry woodland adjacent to M6	Park Hall SINC	SP 15525 90722	Woodland	01 June 2012	25	Within land required
040-PH2-165005	South-western lagoon at old sewage treatment works	Land north of Park Hall SINC	SP 15733 91144	Scrub Grassland Wet woodland	26 June 2013	25	Immediately adjacent
040-PH2-166001	Western grassland within Park Hall SINC	Park Hall SINC	SP 14801 90509	Marshy grassland	15 May 2013	25	Within land required
040-PH2-166002	Central wet grassland within Park Hall SINC	Park Hall SINC	SP 15421 90743	Marshy grassland	15 May 2013	25	Within land required
040-PH2-	Langley Wood	Park Hall SINC	SP 14983	Woodland	01 June	25	Within land required

Ecology survey code	NVC survey site name	Location	OS grid reference	Habitat types included in survey	Survey date	CFA	Distance from land required for the construction of the Proposed Scheme ¹¹⁵ (m) and orientation
166003			90445		2012		
040-PH2-172001	Nechells to Stechford rail line	Land alongside Stechford and Aston Line at Washwood Heath Depot	SP 09964 89088	Grassland	07 June 2013	26	Within land required

Key: Site Designation: SSSI – Site of Species Scientific Interest; LWS – Local Wildlife Site; pLWS – Potential Local Wildlife Site; SINC – Site of Importance of Nature Conservation; SLINC – Site of Local Importance for Nature Conservation

5.3 Deviations, constraints and limitations

5.3.1 Not all areas selected for NVC assessment were subject to survey, due to lack of land access or unacceptable risks posed to surveyors. These sites are listed in Table 17. Where suitable desk study data was available, a description of the proposed survey location has been included.

Table 17: Summary of locations in CFA23, CFA24, CFA25 and CFA26 where requirement for NVC survey identified but no access available for survey

Survey site name	Location	OS grid reference	Description of proposed survey location	CFA	Distance from land required for the construction of the Proposed Scheme ¹¹⁶ (m) and orientation
Berkswell Marsh SSSI	Berkswell Marsh SSSI	SP 22779 79813	Four sites comprising wet woodland, marsh, swamp and grassland habitats identified during Phase 1 Habitat Survey of adjacent areas. Some data provided within designated site citations and from review of available Natural England desk data.	23	Immediately adjacent and linked to land required by hydrological connection
Berkswell Marsh Meadow LWS	Land north-west of Berkswell Marsh SSSI	SP 22462 80071	Four sites comprised marsh, swamp and grassland habitats identified during Phase 1 Habitat Survey of adjacent areas. Some data provided within designated site citation.	23	Within land required
Field adjacent to River Blythe SSSI	Field on B4102 Meriden Road, south-east of Hampton-in-Arden	SP 21420 81691	Marsh, swamp and grassland habitats identified during Phase 1 Habitat Survey for adjacent areas.	23	Within land required

¹¹⁶ The phrase 'Within land required' represents an abbreviation of this term

Survey site name	Location	OS grid reference	Description of proposed survey location	CFA	Distance from land required for the construction of the Proposed Scheme ¹¹⁶ (m) and orientation
A452 Kenilworth Road verge	A452 Kenilworth Road verge between Park Lane and the A45 Birmingham Road	SP 22000 280678	Neutral grassland habitats identified during Phase 1 Habitat Survey.	23	Within land required
Wet woodland adjacent to Hollywell Brook	South-east of Park Farm	SP 20906 835456	Narrow strip of alder carr woodland with willow carr and mixed deciduous woodland, dominated by ash.	24	Within land required
Narrow field south of Hollywell Brook	Field adjacent to channel south of Park Farm	SP 20753 83295	Diverse area of marshy grassland.	24	Within land required
Grass verges of northbound M6	Grass verges of northbound M6	SP 20050 86477	Adjacent to Coleshill & Bannerly Pools SSSI, may support species compositions resembling those present within the SSSI.	24	Within land required
Coleshill & Bannerly Pools SSSI east of A446 Stonebridge Road	Coleshill & Bannerly Pools SSSI east of A446 Stonebridge Road	SP 20381 86403	A site containing dry woodland, wet woodland, scrub and swamp habitats. Some information reviewed within SSSI citation.	24	Within land required
Land between M42 and M6	Land between M42 and M6, due north of Coleshill & Bannerly Pools SSSI	SP 19803 86493	Woodland	24	Within land required
Botanical Site, Island over M6	A446 Stonebridge Road Island at junction 4 of M6	SP 19985 86641	Area within the island is being considered for designation for its botanical interest. No detail known for this site but assumed to have grassland and potentially marshy grassland habitats worthy of NVC survey based on its designated status and proximity to adjacent SSSI.	24	Within land required
B4118 Birmingham Road verges	Stretch of road verge to the south-east of Park Hall SINC	SP 16551 91178	Neutral grassland habitats identified during Phase 1 Habitat Survey.	25	Within land required
Land at Warren Road at former GEC Alstom site	Land to the north of Warren Road, Washwood Heath	SP 10362 89050	Known presence of acid grassland from citation review which was confirmed during Phase 1 Habitat Survey.	26	Within land required

5.4 Baseline

- 5.4.1 A total of 24 sites were surveyed to determine the NVC communities present. A further 12 sites were identified for survey, although these were not achieved due to access constraints. For some of these sites, NVC communities were assigned based on review of available desk data and field study data from other HS2 ecological habitat surveys (Phase 1 Habitat Survey and River Corridor Survey).

Balsall Common and Hampton-in-Arden area (CFA23)

Beechwood Farm (040-PH2-148001)

- 5.4.2 040-PH2-148001 was a field comprising semi-improved neutral grassland. The ground was gently sloping with a southerly aspect, and located adjacent to the existing rail corridor. It had a species-poor sward with occasional meadow vetchling and cuckooflower. Dandelion became locally abundant to the north. The field was of NVC community MG6b rye-grass - crested dog's-tail and sweet vernal-grass sub-community, with locally dominated stands of meadow foxtail which showed affinity to MG7d rye-grass- meadow foxtail grassland.

- 5.4.3 Rye-grass and crested dog's-tail were less frequent on this site than might have been expected for the broad community type. This site has been subject to considerable agricultural improvement and modification in the recent past, with the resulting swards comprising assemblages of relatively common and widespread species. The diversity of species recorded was lower than had originally been anticipated earlier in the growing season, when there was a potential presence of many species.

Ram Hall Farm (040-PH2-149001)

- 5.4.4 040-PH2-149001 comprised sheep-grazed fields either side of the river/stream channel. Swards were consistently species poor and the diversity of species recorded was lower than had originally been anticipated earlier in the growing season, with few herbs throughout. Rye-grass was abundant, with meadow foxtail becoming frequent in places, particularly east of the stream. The fields were a transition of NVC communities MG7b rye-grass- rough meadow-grass leys to MG7d rye-grass - meadow foxtail grassland, with areas of abundant rough meadow-grass which showed affinity to MG7b.

Marlowes Grassland (040-PH2-150001)

- 5.4.5 040-PH2-150001 comprised unmanaged grassland, possibly formerly under arable cultivation. An extensive area of damp Yorkshire-fog rush-pasture grassland was present. Willow (*Salix sp.*) and bramble scrub colonisation was frequent throughout the field. Wetter areas of the field included more frequent rush (*Juncus sp.*), with occasional greater bird's-foot-trefoil (*Lotus pedunculatus*) and cuckooflower. The grassland was typical of NVC community MG10 Yorkshire-fog - soft-rush pasture with some affinity for community MG6 rye-grass - crested dog's-tail.

Marlowes Wood (040-PH2-151001)

- 5.4.6 040-PH2-151001 is a stand of woodland included in the ancient woodland inventory. It formed part of a plantation/woodland complex. Surveyed areas of woodland included

pedunculate oak and hazel, but there was also a substantial non-native component to the canopy. Conifers, sweet chestnut, sycamore and beech occurred in the canopy and shrub layer across much of the woodland. The ground flora included locally dominant bluebell, with occasional three-nerved sandwort (*Moehringia trinervia*) and lesser celandine (*Ficaria verna*). Litter accumulation from beech, sweet chestnut and larch (*Larix decidua*) appeared to be suppressing the abundance and diversity of ground flora species in places. Occasional rhododendron was present within the woodland. The wood appeared to be managed, with some recent thinning work evident within the woodland at the time of survey. This habitat was typical of NVC community W10a pedunculate oak - bracken - bramble woodland. It was lowland mixed deciduous woodland and therefore is classified as a habitat of principal importance.

- 5.4.7 W10 oak woodland is typical of less base-rich habitats and is widespread and common in lowland England. Much of the woodland surveyed within the land required for the construction of the Proposed Scheme showed closest affinity to this community.

Sixteen Acre Wood (040-PH2-152001)

- 5.4.8 040-PH2-152001 is a wood very similar to 040-PH2-151001, but with a more disturbed and species-poor ground flora, possibly due to recent clearance of the under-storey. It comprised a 40-50 year old conifer and sweet chestnut plantation with a very sparse shrub layer of native broadleaved species including rowan and silver birch. Elsewhere bramble was the main field layer component. Recent brash clearance was evident at the time of survey. Rhododendron was also recorded. The abundance of bramble within the field layer and scattered occurrence of other typical field layer species (bluebell, honeysuckle) align it with the NVC community pedunculate oak - bracken - bramble W10 woodland, but this is complicated by the recent clearance of understory vegetation and the replacement canopy which is dominated by conifers, with areas of sweet chestnut. Sweet chestnut is occasionally associated with the W10 vegetation community as a replacement species for oak in plantations and is usually found to have been coppiced. The sweet chestnut trees here occur as standards.

Patrick Farm Meadow LWS(040-PH2-153001)

- 5.4.9 040-PH2-153001 is a meadow of moderate species diversity, adjacent to Horn Brook. The field slopes gently from the hedgerow in the north, becoming flatter and correspondingly wetter towards the brook. The character of the grassland sward varied along a moisture gradient, with slightly drier conditions that prevailed in the north, where the sward included more frequent common knapweed and common bird's-foot-trefoil. Wetter areas to the south showed affinity to MG4 where meadow foxtail and meadowsweet became locally abundant. In the south-west corner of the field, particularly wet conditions were evident in the local abundance of lesser pond-sedge and soft-rush. Frequent meadow vetchling, and meadow buttercup were present throughout.
- 5.4.10 Despite the presence of common knapweed in the drier areas of this grassland meadow, there was only a low affinity with the NVC community MG5 crested dog's-tail - common knapweed grassland. The grassland is therefore best described as a

transition community with localised affinity for MG₄ meadow foxtail - great burnet grassland in wetter areas.

- 5.4.11 Unimproved MG₄ grassland is included under Annex 1 of the Habitats Directive¹¹⁷ and is described as the Habitat Biotope H6510. The MG₄ community is rare across Europe and in the UK is largely restricted to the floodplains of central and southern England.
- 5.4.12 A small colony of hairy lady's-mantle, a Warwickshire Notable plant species, was present on the northern bank.

Gravel Pit Plantation (040-PH2-153002)

- 5.4.13 040-PH2-153002 was a small area of woodland adjacent to Cornet's End Lane. Alder was frequent in the east, where the ground flora comprised abundant bramble, honeysuckle and broad buckler-fern (*Dryopteris dilatata*). Drier areas to the west included more frequent pedunculate oak and occasional bluebell. Much of the woodland, particularly the stand immediately west of Cornet's End Lane, showed close affinity to W6e alder - common nettle, downy birch sub-community. To the north and east, drier areas of the woodland comprised more frequent pedunculate oak and hazel, which suggested localised transition to W10 pedunculate oak - bracken - bramble woodland.

Fields adjacent to River Blythe SSSI (040-PH2-154001)

- 5.4.14 040-PH2-154001 was a field north of the River Blythe SSSI on the eastern edge of Hampton-in-Arden. It supported coarse grassland dominated by meadow foxtail with false oat-grass and cock's-foot. There were small areas which included finer textured swards of moderate diversity, such as more frequent sweet vernal-grass, red clover and meadow buttercup. This habitat had affinities with NVC community MG6a rye-grass- crested dog's-tail grassland. Rye-grass and crested dog's-tail were less frequent on this site than might have been expected for the broad community type, particularly as this site had been subject to agricultural improvement and modification in the recent past.

Mouldings Green Farm, Hampton-in-Arden LWS (040-PH2-154002)

- 5.4.15 Alongside the River Blythe was a thin wooded strip along the riverbank. It was not subject to NVC survey due to its small size, but canopy species included ash, field maple and hazel, over ground flora included common ivy, ground-ivy (*Glechoma hederacea*) and false brome (*Brachypodium sylvaticum*). The woodland has similarities with NVC community W8 ash- field maple - dog's mercury (*Mercurialis perennis*) woodland. W8 woodlands are common and widespread in lowland England, and the stand at this location was small in extent.
- 5.4.16 The small area of floodplain alongside the River Blythe SSSI comprised grassland with meadow foxtail and meadowsweet with the wettest areas including occasional soft-rush, lesser pond-sedge and yellow iris (*Iris pseudacorus*). The margins of the site in particular were becoming dominated by tall herb and scrub species, including common nettle, broad-leaved dock, and meadowsweet. This habitat was classified to

¹¹⁷ European Commission; The Habitats Directive; <http://ec.europa.eu/environment/nature/legislation/habitatsdirective/>; accessed: March 2013

be of NVC community MG₄ meadow foxtail - great burnet grassland. Unimproved MG₄ grassland is included under Annex 1 of the Habitats Directive¹¹⁸ and is described as the Habitat Biotope H6510. This MG₄ community is rare across Europe and in the UK is largely restricted to the floodplains of central and southern England.

- 5.4.17 At this site, however, coarse grasses such as false oat-grass were becoming locally prominent in the sward, although desirable herb species remained occasional to frequent across much of the site, and included great burnet, cut-leaved crane's-bill (*Geranium dissectum*) and meadow vetchling.

Sites not surveyed in the Balsall Common and Hampton-in-Arden area (CFA23)

Berkswell Marsh SSSI

- 5.4.18 Berkswell Marsh SSSI is located immediately adjacent to the land required for the construction of the Proposed Scheme. The SSSI citation states that the site comprises the largest area of fen meadow in the county alongside two smaller blocks of wet woodland. Bayleys Brook, a tributary of the River Blythe SSSI, flows through the site and in places forms a split channel. In addition there were several small surface water drains present along the length of this brook.
- 5.4.19 The most detailed data provided by Natural England described the results of NVC surveys undertaken in 1993, whereby 18 quadrats were taken across the SSSI. Surveyors concluded that the following communities were present:
- M23a soft-rush / sharp-flowered rush – Marsh-bedstraw rush pasture occupied the area north of the stream and to the west of the drain which ran north to south across the site. The stand comprised abundant sharp-flowered rush, meadowsweet and angelica;
 - S7 lesser pond sedge swamp was found in stands in less species-rich areas of the site, to the south of the stream and to the west;
 - S28 reed canary-grass swamp occurred in small areas within the wider stands of S7; and
 - W6b Alder – common nettle woodland to the east of the fen meadow. Dominant willow occurred over species including lesser pond sedge and meadowsweet.
- 5.4.20 An additional coarse grassland community occurred along the northern boundary of the site for which no NVC data was available. This was not considered to be a primary feature for designation but based on the species list this area may be of the NVC communities MG₁ *Arrhenatherum elatius* grassland and/or MG₉.
- 5.4.21 The vegetation communities described in the Natural England data set appeared to be highly dependent on the depth and composition of the water table on site. Hydrological conditions created by surrounding land use and ground conditions were

¹¹⁸ European Commission; The Habitats Directive; <http://ec.europa.eu/environment/nature/legislation/habitatsdirective/>; accessed: March 2013

highly important in the maintaining the composition and condition of the vegetation communities.

Berkswell Marsh Meadow LWS

5.4.22 Berkswell Marsh Meadow lies to the north-east of Berkswell Marsh SSSI. Available desk study information for the site was less detailed than for the land of the adjacent SSSI, but some reference to the NVC communities present on site was provided in the local site citation prepared in 2001, as follows:

- MG10 Yorkshire fog - soft- rush pasture, with locally abundant *Juncus acutiflorus*, and a range of locally frequent herbs including meadowsweet, *Lotus pendunculatus* and *Alchemilla vestita*;
- MG9 grassland with locally frequent herbs including meadow vetchling, *Lotus pendunculatus* and meadowsweet, to the south and west of the stream;
- two stands of S7 lesser pond sedge swamp also occurred in the area, where additional herbs included devil's-bit scabious and *Scutellaria galericulata*; and
- improved and species-poor semi-improved MG6 grassland which lay north and east of the stream.

5.4.23 Given its location adjacent to the SSSI and the hydrological connectivity between the two sites, the Berkswell Marsh Meadow LWS should be viewed as part of the same habitat complex as the nationally designated site.

River Blythe SSSI Patrick Farm Bridge to A452 Kenilworth Road bridge

5.4.24 The River Blythe at Patrick Farm Bridge is a fast to slow flowing river supporting a diverse flora within the deeper sections of the watercourse. The river supported locally abundant yellow water-lily (*Nuphar lutea*), arrowhead (*Sagittaria sagitifolia*), reed canary-grass and branched bur-reed. There were locally frequent stands of common club-rush (*Schoenoplectus lacustris*) and river water-crowfoot, occasional stands of water-starwort (*Callitriche* sp.), soft-rush, fool's-water-cress, reed canary-grass, branched bur-reed and great willowherb and rare water forget-me-not (*Myosotis scorpiodes*). No specific management of this community occurs, but natural river processes and flood conditions will shift the patterns of this vegetative community within the river. This habitat was typical of the NVC A8 yellow water-lily community.

Field adjacent to River Blythe SSSI

5.4.25 From review of available Phase 1 Habitat Survey data, this habitat was assumed to be MG6 rye-grass - crested dog's-tail. This habitat was used for grazing, the sward typically being short. It was possible that in damper areas (ditch edges), away from grazing pressure, that a more diverse sward was present as meadowsweet was recorded here. It is thought these areas are too small to function as true marshy grassland communities, like those found on the opposite river bank.

A452 Kenilworth Road verge

5.4.26 From review of available Phase 1 Habitat Survey data this roadside verge was assumed to be the community MG5 crested dog's-tail- common knapweed grassland.

This habitat was managed, although this was assumed to be for amenity reasons rather than for preservation of the habitat type. In some areas where ranker growth prevailed, there may have been similarities to MG1e false oat-grass grassland, common knapweed sub-community.

Birmingham Interchange and Chelmsley Wood area (CFA24)

Hollywell Brook (040-PH2-156001)

- 5.4.27 Four types of vegetation were identified alongside Hollywell Brook. There were small areas of damp Yorkshire-fog and soft-rush pasture which appeared subject to periodic seasonal inundation and were locally dominated by carpets of creeping buttercup. The areas were classified as NVC community MG10 Yorkshire-fog - soft-rush pasture.
- 5.4.28 There was also marginal vegetation comprising lesser pond-sedge stands, with stands of branched bur-reed, hemlock water-dropwort and great willowherb. Several other wetland species also occurred within these stands including soft-rush, meadowsweet, common marsh-bedstraw, water mint, brooklime and wild angelica. The stands exhibited characteristics of NVC communities S7 lesser pond-sedge swamp and S14 branched bur-reed swamp. No specific NVC survey was undertaken of this habitat due to access constraints, but detailed survey notes from the Phase 1 Habitat Survey and River Corridor Survey were reviewed.
- 5.4.29 The fields adjacent to Hollywell Brook contain prominent sweet vernal-grass and creeping bent in the sward, particularly in comparison to the surrounding MG7d meadow foxtail dominated community. Species diversity was low, but the community included occasional creeping buttercup and common sorrel (*Rumex acetosa*) throughout. It was classified as NVC community MG6b rye-grass - crested dog's-tail grassland, sweet vernal-grass sub-community.
- 5.4.30 Within the fields adjacent to Hollywell Brook there are also communities of species-poor grassland, dominated by meadow foxtail. Forbs were rare within these communities, but included occasional common sorrel and creeping buttercup. This area was classified as NVC community MG7d rye-grass leys and related grassland, rye-grass - meadow foxtail sub-community, although rye-grass rarely reached high abundance.

Hampton-in-Arden to Shustoke disused rail line (040-PH2-156002)

- 5.4.31 040-PH2-156002 supported hawthorn and blackthorn scrub which ran along the former rail line embankment. Common nettle and dog's mercury were abundant in the ground flora, with occasional pedunculate oak. This area was classified as NVC community W21b hawthorn -common ivy scrub, dog's mercury sub community.

Sidings Wood (040-PH2-156003)

- 5.4.32 There is a small area of woodland adjacent to arable land and the A452 Chester Road, just east of Park Farm. It is dominated by mature, even-aged pedunculate oak. The shrub layer is extremely sparse, comprising scattered individual stands of hawthorn and elder. The ground flora is species-poor, comprising carpets of Yorkshire-fog, with occasional false brome, false oat-grass and occasional common nettle. This area is

classified as NVC community W10e, pedunculate oak - bracken - bramble woodland, sycamore - wood-sorrel sub-community.

- 5.4.33 There was a coarse grassland strip between the woodland, and arable land to the north of the woodland. Large tussocks of false oat-grass occurred, with common couch and rank associates. Finer areas of red fescue occurred to the south and west. This area was classified as NVC community MG1a false oat-grass grassland, red fescue sub-community.
- 5.4.34 A small damp area had formed north-east of the woodland, supporting abundant soft-rush, Yorkshire-fog and common sorrel, with locally frequent common nettle and dock. This area was typical of NVC community MG10 Yorkshire-fog - soft-rush pasture.
- 5.4.35 There was a steeper grassland bank, with some scrub encroachment south of the woodland which was subject to NVC assessment. No management of this vegetation was evident other than light grazing and disturbance by rabbits. This area has a mixture of species present some with preference for acidic conditions such as sheep's sorrel (*Rumex acetosella*) and gorse (*Ulex europaeus*), or species with preference for drier conditions such as squirrel-tail fescue (*Vulpia bromoides*). Other species present were associated with the adjacent woodland such as red campion (*Silene dioica*), bramble and pignut (*Conopodium majus*). Further species present include frequent common bent and Yorkshire-fog, field wood-rush (*Luzula campestris*) and hawthorn. This area cannot be assigned to a specific vegetation community type due to its mixed species composition.

Denbigh Spinney LWS (040-PH2-157001)

- 5.4.36 040-PH2-157001 comprised damp alder and downy birch (*Betula pubescens*) woodland adjacent to the Olympia Motorcycle track. Abundant broad buckler-fern, bramble and honeysuckle were present in the understory, with characteristics of W6e alder-common nettle woodland, downy birch sub-community. Small, damper patches of the wood were more species-rich and showed closer affinity to W6d. These included occasional gypsywort (*Lycopus europaeus*), enchanter's-nightshade (*Circaea lutetiana*), and marsh violet (a Warwickshire notable species). Invasive species present included Japanese knotweed, abundant on adjacent land and gradually encroaching, and yellow archangel recorded on the southern boundary of woodland, along Middle Bickenhill Lane. Denbigh Spinney was designated as an LWS as the only known example of W6e woodland in Warwickshire, although during the surveys this sub-community was also identified at the woodland north of Hornbrook Farm.

Coleshill & Bannerly Pools SSSI (Coleshill Pool) (040-PH2-158001)

- 5.4.37 Acidic oak woodland occurred within drier, eastern areas of Coleshill & Bannerly Pools SSSI. This area was classified as NVC community W16a oak (*Quercus spp.*)-birch (*Betula spp.*)-wavy hair-grass woodland, pedunculate oak sub-community. Drier oak types dominated to the east and north of Coleshill Pool.
- 5.4.38 The Phase 1 description from surveys undertaken in 1983 and the SSSI citation referred to locally abundant heather in the ground flora. This species was not recorded on site during any of the 2012 field surveys. Its historic presence reflects the acidic

character of the soils present, and together with the occasional presence of wavy hair-grass and heath bedstraw and the nearby abundance of cross-leaved heath towards the mire edges, lend weight to including the woodland as a form of W16.

- 5.4.39 A sudden transition from W16 to more a mesophytic W10 community was apparent to the north-west of Coleshill Pool, where frequent pedunculate oak occurred over a ground flora dominated by bluebell. The shrub layer species became more diverse than in the southern part of the wood. This area was classified as NVC community W10a pedunculate oak - bracken - bramble woodland, with some affinity for W10d Yorkshire-fog sub-community.
- 5.4.40 In the south of the site, the distinction between species-poor W10, W16 and drier stands of W4 downy birch - purple moor-grass (*Molinia caerulea*) woodland was less well defined. Pedunculate oak and birch spp. occurred over a ground flora variously characterised by bracken, bramble, wavy hair-grass and broad buckler-fern (*Dryopteris dilatata*), which may have been characteristic both of W4e and the drier oak woodland types.
- 5.4.41 In the west of the site was an alder dominated stand. It was classified as NVC community W4 downy birch - purple moor-grass woodland, with some affinities for W6 alder- common nettle woodland. The south-west of the site supported drier stands of downy birch over a ground flora characterised by abundant broad buckler-fern and bramble. Purple moor-grass was locally abundant. This area was classified as NVC community W4a downy birch – purple moor-grass woodland, broad buckler-fern - bramble sub-community in drier areas, and grades out to W4c downy birch – purple moor-grass woodland, Sphagnum spp. sub-community in damper areas. Mosses *Sphagnum fimbriatum*, *Sphagnum palustre* and *Sphagnum squarrosum* were recorded.
- 5.4.42 Towards the west of the site, between the two pools, was an area of downy birch / grey willow woodland surrounding the mire, where wetter stands of downy birch dominated woodland occurred nearer the margins of the open mire surface. Standing water was frequent in these areas, with locally frequent grey willow. Mosses became frequent in the ground flora. A small stand of alder suggested local affinity to W6, but was very limited in extent.
- 5.4.43 The more southern pool (Coleshill Pool) contained vegetation classified as NVC community M4 bottle sedge - bottle sedge-moss (*Sphagnum recurvum*) mire. It formed a transition zone between open water and the drier mire margins, comprising frequent purple moor-grass, common hair moss (*Polytrichum commune*) and other mosses. The eastern edge of Coleshill Pool was open mire. It was locally dominated by bottle sedge, with abundant feathery bog-moss (*Sphagnum cuspidatum*) and flat-topped bog-moss (*Sphagnum fallax*). Small areas of bare peat occurred along the woodland margins, likely to have been caused during scrub clearance works. The margins were classified as NVC community M4 bottle sedge-bottle-moss mire, with some affinity for M25 purple moor-grass -tormentil mire.
- 5.4.44 The more northern pool comprised a large area of open mire surface, with two deeper areas of open water. Aerial photographs and the distribution of emergent vegetation suggested yearly and seasonal variation in the water table depth. At the time of

survey much of the mire surface to the north, visible in historic aerial photos, was entirely submerged and therefore inaccessible. Information from the 1983 Phase 1 survey suggests that greater pond-sedge and lesser pond-sedge were locally dominant on the site, but in 2013 bottle sedge was found to be the dominant species across the mire surface. Large stands of this species were found across the shallower areas of the mire, with occasional soft-rush and invading birch and willow scrub. Mosses (*Sphagna*) were abundant across the mire, and species recorded included flat-topped bog-moss and feathery bog-moss across the mire surface. Towards the drier eastern margins of the mire, purple moor-grass and cross-leaved heath became more frequent, occurring alongside abundant common hair moss and ribbed bog-moss (*Aulacomnium palustre*). The extent of bottle sedge indicates a NVC community M₄ bottle sedge-mire, with likely smaller areas of S₁₂ bulrush swamp at the peripheries.

- 5.4.45 The Annex 1 habitat: old acidophilous oak woods with pedunculate oak on sandy plains, is broadly equivalent to the NVC W₁₆ vegetative community. Wet woodland, lowland mixed deciduous woodland and lowland fen are habitats of principal importance. The Coleshill & Bannerly Pools SSSI also comprises the only valley mire system in the county of Warwickshire.

Coleshill Pool Wood LWS (040-PH2-158002)

- 5.4.46 Coleshill Pool Wood has been separated from Coleshill & Bannerly Pools SSSI by the construction of the M₄₂.
- 5.4.47 The western half of the woodland showed more evidence of disturbance and species introduction, where the canopy and shrub layers included locally abundant sycamore with occasional pedunculate oak and elder. The ground flora was generally sparse, though bluebell became locally frequent in small patches. It has most similarity with NVC community W_{10e} pedunculate oak -bracken- bramble woodland, sycamore-wood-sorrel sub-community with some affinity for W₁₆ oak-birch- wavy hair-grass woodland to the south.
- 5.4.48 To the east, the woodland was dominated by birch over a ground flora of broad buckler-fern, bramble and honeysuckle. It was classified as NVC community W_{4a} downy birch – purple moor-grass, broad buckler-fern - bramble sub-community woodland. Wet woodland is a habitat of principal importance.

Sites not surveyed in the Birmingham Interchange and Chelmsley Wood area (CFA24)

Hollywell Brook at Park Farm

- 5.4.49 Two areas of this site could not be accessed for NVC survey due to the commencement of quarrying operations. These include marshy grassland habitat and wet woodland.
- 5.4.50 The grassland site was identified during Phase 1 Habitat surveys and situated within a narrow field that meets Hollywell Brook at a 90° angle. The northern part of this site had been affected directly by the quarrying activities. It comprised a ridge and furrow field that was historically managed for silage followed by aftermath-grazing. Small areas within this field were thought to represent the MG₄ meadow foxtail - great

burnet community (based on these and other typical species being recorded during the Phase 1 Habitat survey) with other areas showing tendencies towards MG5, and for the areas nearer to Hollywell Brook, the MG10 community. This was concurrent with NVC survey findings adjacent to this brook elsewhere. The southern part of this narrow field was unaffected by quarrying activity, but there was no access to it through the quarry.

5.4.51 MG4 is an Annex 1 habitat and the grassland here may have qualified as being this habitat type, before it was affected by quarrying activity.

5.4.52 Surrounding Hollywell Brook due west of the A452 Chester Road was an area of wet woodland. This habitat could not be surveyed due to quarrying activities. From review of Phase 1 Habitat Survey data and the River Corridor Survey for Hollywell Brook, this habitat was assumed to be the W6 Alder-common nettle based on the species present. Slightly drier areas of this woodland may represent the W8 ash - field maple-dog's mercury community.

Grass verges of northbound M6

5.4.53 The M6 verges, where not improved are likely to support tall herb or acid grassland habitats being situated on the same acidic soil types as the adjacent Coleshill & Bannerly Pools SSSI.

Coleshill & Bannerly Pools SSSI east of A446 Stonebridge Road

5.4.54 Very limited information was received via desk study, with only the SINC citation sheet from 1998 available for review. This, together with information from the Phase 1 Habitat Survey, identified the site to have habitats that were concluded to support the following vegetative communities:

- W10 oak-bracken-bramble woodland;
- W4 downy birch - purple moor-grass in transition to W10 oak- bracken - bramble woodland;
- S25a common reed -hemp agrimony, common reed sub-community;
- W2 grey willow- downy birch - common reed woodland; and
- W21 hawthorn (*Crataegus mongyna*)-ivy scrub / W10 oak-bracken-bramble woodland mosaic.

5.4.55 The W10 woodland community was represented by occasional mature and semi-mature oak standards, and some of the typical ground flora species, but was becoming encroached by the invasive species Rhododendron. Near the eastern end of the woodland was an expanse of S25a swamp, the common reed sub community of the S25 common reed – hemp agrimony vegetative community.

5.4.56 The dense areas of willow scrub were not determined to an NVC community in the citation sheet, but from the species composition appeared to show similarities to W2 grey willow- downy birch - common reed woodland, though also supported species associated with the W21 hawthorn-ivy scrub community. This may be a reflection of the damper versus the drier conditions at the site being represented within the under-

storey layer. It was not known whether these communities persisted to any great extent or whether they had since developed into other vegetative communities. From review of the Phase 1 Habitat survey the W21 community appeared to persist at the northern periphery of the site adjacent to the M6 boundary, but occurred in a mosaic with typical W10 canopy and ground flora.

Land between M42 and M6

- 5.4.57 This was a stand of secondary woodland located between the M42, M6 and associated access slip-roads. The canopy comprised even-aged sycamore and ash. Occasional sycamore and hawthorn were present in the shrub layer. There was a sparse, species-poor ground flora including occasional common nettle and cleavers. No NVC classification was assigned.

Botanical Site, Island over M6

- 5.4.58 The habitats at this site were not subject to a Phase 1 Habitat Survey, and whilst the M6 junction 4 island was named as Botanical Site, Island over M6 (Damp hollow adjacent to A441T), no further information regarding this was available for review. It was assumed it had been designated for its diverse grassland flora.

Castle Bromwich and Bromford area (CFA25)

Parkhall Wood (040-PH2-165001)

- 5.4.59 040-PH2-165001 was a steep sloping, north-facing woodland in the east of the Park Hall SIN. It was ancient woodland with a semi-natural canopy of locally frequent wych elm (*Ulmus glabra*), pedunculate oak, ash and wild cherry (*Prunus avium*). The dense, species-rich field layer included bluebell, dog's mercury and ramsons (*Allium ursinum*). The habitat was typical of NVC community W10 pedunculate oak -bracken-bramble woodland. Lowland mixed deciduous woodland is a habitat of principal importance. Parkhall woodland appeared to comprise the most diverse and intact W10 woods within CFA23, CFA24, CFA25 and CFA26.

Grassland between Parkhall Wood and Birmingham and Derby rail line (040-PH2-165002)

- 5.4.60 There were two types of homogenous vegetation in this area, one an area of poorly drained grassland with dominant tussocks of tufted hair-grass (*Deschampsia cespitosa*). Occasional meadowsweet and great burnet occurred to the far-east. Wet ditches adjacent to the stand included locally abundant sweet-grass (*Glyceria spp.*), where marsh foxtail (*Alopecurus geniculatus*) became more frequent. This area is classified as NVC community MG9a Yorkshire-fog - tufted hair-grass grassland, rough meadow-grass sub-community.
- 5.4.61 The second community was an area of species-poor grassland, with frequent meadow foxtail, Yorkshire-fog and hairy sedge, and occasional common couch, creeping bent and creeping buttercup. Locally frequent pignut occurred, reflecting the unmanaged and undisturbed by ploughing nature of the grassland. Much of the area received nutrient input from flooding by the River Tame. This habitat was a poor fit to the NVC community MG10, likely due to the low presence of soft-rush. Otherwise the community was typical of MG10. Some localised presence of MG7 as a mosaic may

have been evident where the grassland had been enriched (potentially through receipt of eutrophic floodwaters or cattle dung) or where grassland habitats had been re-seeded.

Field adjacent to B4118 Birmingham Road and Parkhall Wood (040-PH2-165003)

- 5.4.62 040-PH2-165003 was an area of dry semi-improved grassland, located south and west of Park Hall SINC. The sward was horse-grazed and included abundant meadow-grass (*Poa spp.*) and common bent, with occasional crested dog's-tail and rye-grass. Ribwort plantain and white clover were frequent throughout, with locally abundant common bird's-foot-trefoil and rare meadow vetchling. Hawthorn and bramble scrub was scattered within the field. The habitat was typical of NVC community MG6a rye-grass - crested dog's-tail grassland, with some affinity for MG9 Yorkshire-fog - tufted hair-grass grassland. The most species-rich areas classified as MG6 comprised the drier swards, which included locally frequent common bird's-foot-trefoil, ribwort plantain and lesser trefoil (*Trifolium dubium*).

Wet and dry woodland adjacent to M6 (040-PH2-165004)

- 5.4.63 040-PH2-165004 was an area of ancient woodland occupying the north-facing slope adjacent to the M6. The semi-natural canopy was similar in character to Park Hall and included pedunculate oak, wild cherry, ash and wych elm. A diverse ground flora included bluebell, dog's mercury and ramsons. Additional notable species included enchanter's-nightshade, wood-sorrel and broad-leaved helleborine. The habitat had most similarities with NVC community W10.

South-western lagoon at old sewage treatment works (040-PH2-165005)

- 5.4.64 The vegetation in this area was surveyed only using binoculars due to the unsafe ground conditions. There was an area of marshy grassland at the eastern end of the disused sewage lagoon adjacent to the land required for the construction of the Proposed Scheme. It was dominated almost exclusively by Yorkshire-fog, with frequent creeping bent and bittersweet (*Solanum dulcamara*). Rare species in this community were cock's-foot, bulrush and willowherb. This had similarities to species-poor NVC community MG9 Yorkshire-fog - tufted hair-grass grassland.
- 5.4.65 This was also a large area of scrub, which occupied much of the south-western disused sewage lagoon. It was dominated almost exclusively by grey willow, with stands of reed canary-grass and Indian balsam under and adjacent to the willow scrub. The habitat was likely to be NVC community W2 grey willow - downy birch - common reed woodland, based on the dominance of grey willow and the presence of common reed.
- 5.4.66 Wet woodland is a habitat of principal importance.

Western grassland within Park Hall SINC (040-PH2-166001)

- 5.4.67 Of the two types of vegetation community in this area, one is not dissimilar to the damp, species-poor grassland swards which comprised much of the pasture at Park Hall SINC. Meadow foxtail, meadow buttercup and hairy sedge were frequent throughout, with occasional Yorkshire-fog, common couch, creeping bent and creeping buttercup. The grassland was likely to receive nutrient input from flooding by

the River Tame SLINC. The area was also known to have received historic disturbance which together with regular nutrient input was likely to have suppressed levels of floristic diversity and to have caused some elements of soil mixing. Additionally the grassland had recently been subject to cattle grazing, giving rise to many areas of poached ground.

- 5.4.68 The grassland showed a poor correlation with NVC communities MG7 and MG10, (there was a notable lack of soft-rush), and has some affinities with MG9 where rough meadow-grass was dominant, but again it lacks the key species tufted hair-grass. Localised areas near the river and pool margins also showed affinity to MG11 inundation grassland, where creeping bent and meadow foxtail became more frequent.
- 5.4.69 The SINC citation for the grassland habitats at Park Hall SINC, suggested a higher diversity in the grassland swards than was evident on site in 2013. Species such as betony (*Stachys officinalis*), devil's-bit scabious and ragged-robin were not recorded during NVC surveys. The swards comprising much of the site, classified here as MG7 and MG10, were generally of low species-richness. Smaller areas with increased botanical interest (including MG6 swards to the west and the central wet MG9 grassland) displayed increased botanical diversity, but were restricted in extent across the site as a whole.
- 5.4.70 A second vegetation community comprised areas of drier, more herb-rich grassland in the west of Park Hall SINC. Rye-grass and crested dog's-tail were occasional and forbs include common bird's-foot-trefoil, common vetch (*Vicia sativa*), autumn hawkbit (*Scorzoneroidea autumnalis*) and red bartsia. The grassland was cattle-poached at the time of survey. It has similarities with NVC community MG6a rye-grass - crested dog's-tail grassland. The most species-rich areas are on the land adjacent to Water Orton Road, which included locally frequent common bird's-foot-trefoil, ribwort plantain and lesser trefoil.

Central wet grassland within Park Hall SINC (040-PH2-166002)

- 5.4.71 Tufted hair-grass was prominent in the sward of this grassland, forming large tussocks in places.
- 5.4.72 Occasional meadow foxtail, meadowsweet and meadow vetchling and rare great burnet occurred in the wetter areas. The habitat was similar to NVC community MG9a, but also possible affinities to MG4

Langley Wood (040-PH2-166003)

- 5.4.73 040-PH2-166003 located in Park Hall SINC lay on steep north-west facing slopes adjacent to the M6. This was an area of replanted woodland in the west of the nature reserve, with a canopy comprising abundant sycamore with occasional ash and beech. The field layer comprised locally frequent common nettle and bramble, cleavers and common chickweed (*Stellaria media*) with occasional wood melick (*Melica uniflora*), bluebell and red campion (*Silene dioica*). It had some similarities, although not a great fit, with NVC community W8 ash- field maple - dog's mercury woodland, despite the modified canopy. W8 ash woodlands are common and widespread in lowland

England, although all lowland mixed deciduous woodland is a habitat of principal importance.

Sites not surveyed the in Castle Bromwich and Bromford (CFA25)

B4118 Birmingham Road verges

- 5.4.74 These narrow strips of grassland were situated either side of the B4118 were thought to support a more diverse representation of the MG1 false oat-grass -grassland, MG1a the common knapweed sub-community due the presence of dominant red fescue, false oat-grass, cock's-foot, common knapweed, perforate St John's-wort (*Hypericum perforatum*) and yarrow. Some areas of this habitat developed into ranker forms of this community type that were less diverse or may have shown similarities with the MG6 grassland community within the adjacent field on the northern side of this road.

Washwood Heath to Curzon Street area (CFA26)

Nechells to Stechford rail line (040-PH2-172001)

- 5.4.75 These were unmanaged grassland slopes on active Network Rail land. Grassland swards were becoming rank and were locally dominated by false oat-grass, but included occasional wavy hair-grass, hawkweed (*Hieracium* agg.) and field wood-rush. Acidiphilous elements to the swards were evident where wavy hair-grass was locally frequent. More extensive swards of the acidiphilous community occurred in the wider area away from the land required for the construction of the Proposed Scheme. Despite the clear acidiphilous component, the vegetation community had most similarities with NVC community MG1, which is common and widespread across lowland England.

6 River habitat survey

6.1 Introduction

- 6.1.1 This section of the appendix presents details of River Habitat Survey¹¹⁹ (RHS) data for the section of the Proposed Scheme that will pass through CFA23, CFA24, CFA25 and CFA26.

6.2 Methodology

- 6.2.1 Details of the standard methodology used for RHS surveys are provided in the Ecology technical note: Ecological field survey methods and standards (Volume 5: Appendix CT-001-000/2).
- 6.2.2 No desk study information relevant to inform the survey was available. The River Habitat Survey website¹²⁰ has records of where previous RHS have been undertaken, however it was not possible to determine which 500m sections these corresponded to, and previous survey sheets were not accessible.
- 6.2.3 A summary of locations at which RHS was undertaken is provided in Table 18, and is shown in Map series EC-10 (Volume 5, Map Book Ecology).

Table 18: Summary of RHS survey locations

Ecology survey code	Watercourse	Feature type	Survey date	CFA	Distance from land required for the construction of the Proposed Scheme ¹²¹ (m) and orientation
040-RH1-148001 040-RH1-149001 040-RH1-149002	Bayleys Brook	Stream	05 June 2013	23	Within land required.
040-RH1-153001 040-RH1-154001	River Blythe SSSI	Main river	05 June 2013 06 July 2013	23	Within land required.
040-RH1-155001	Shadow Brook	Stream	06 June 2013	23	Within land required.
040-RH1-155002	River Blythe SSSI	Main river	10 June 2013	24	Within land required.
040-RH1-156001 040-RH1-156002 040-RH1-156003	Hollywell Brook	Stream	10 June 2013	24	Within land required.
040-RH1-166001 040-RH1-166002 040-RH1-166003 040-RH1-166004 040-RH1-170001	River Tame SLINC	Main river	11 June 2013 12 June 2013	25 and 26	Within land required.
040-RH1-166005	Plants Brook	Stream	11 June 2013	25	Within land required.
040-RH1-173001 040-RH1-174001	River Rea	Main river	13 June 2013	26	Within land required.

¹¹⁹ RHS is a system devised by the Environment Agency for assessing the character and habitat quality of rivers based on their physical structure.

¹²⁰ River Habitat Survey; RHS map; <http://www.riverhabitatsurvey.org/>; accessed: 10 April 2013

¹²¹ The phrase 'Within land required' represents an abbreviation of this term

6.3 Deviations, constraints and limitations

6.3.1 The methodology for RHS surveys were adhered to throughout with exceptions as detailed in Table 19.

Table 19: Summary of locations where requirement for RHS identified but no access available for survey

Watercourse	Location	OS grid reference - Start and finish	Feature type and comments	CFA	Distance from land required for the construction of the Proposed Scheme ¹²² (m) and orientation
Bayleys Brook	Adjacent to Marsh Lane Nature Reserve	SP 21745 80286 to SP 23055 79678	Stream No land access	23	Within land required.
River Tame SLINC	Urban areas of the River Tame SLINC	SP 11616 89470 to SP 10708 89572	Most sections were either inaccessible, or access was not granted. Given the urban nature of the catchment, the sections not surveyed are considered likely to be similar to those described in the Castle Bromwich and Bromford area (CFA25), and are known to have been re-aligned with stone/concrete banks.	26	Within land required

6.4 Baseline

Bayleys Brook, centred on Berkswell Station within the Balsall Common and Hampton-in-Arden area (CFA23)

6.4.1 This is a small watercourse of between 1-2m depth which passes through agricultural land. Overall, these three sections show no obvious signs of previous realignment or over-deepening, and are not impounded by a weir or dam. Erosional and depositional features (e.g. riffles, pools and point bars) are not present, though a small number of artificial features (e.g. culverts, bridges and bank strengthening) are present. Dense scrub and broadleaved woodland is present immediately adjacent to the channel. No invasive species are present in any of the sections, and no features of special interest were recorded. Flow type is generally smooth, and vegetation is dominated by emergent reeds/sedges/rushes/grasses/horsetails in Section 1, with channel vegetation absent in 2 and 3. Three sections of Bayleys Brook were surveyed near Berkswell Station using RHS. Survey results are shown in Table 20, Table 21 and Table 22.

¹²² The phrase 'Within land required' represents an abbreviation of this term

Table 20: River Habitat Survey data sheet for Section 1, Bayleys Brook

A. Field Survey Details	Ecology survey code		040-RH1-148001 - Section 1										
	Name of watercourse		Bayleys Brook										
	Surveyor(s)		FM										
	Survey start (24 hr. clock)		11:15										
	OS grid reference	Start section	SP 24913 77242										
		End section	SP 24593 77622										
	Date		05 June 2013										
	Photo reference(s)		BB 1,2,3										
	River or Artificial Channel		River										
	Is the riverbed visible		Entirely										
B. Predominant Valley Form			Shallow vee										
C. Number of Riffles, Pools and Point Bars	Riffle(s)		0										
	Pool(s)		0										
	Un-vegetated point bar(s)		0										
	Vegetated point bar(s)		0										
D. Artificial Features	Channel realigned		No										
	Channel over-deepened		No										
	Water impounded by weir/dam		No										
	Other		One major culvert, two minor bridges										
E. Physical Attributes	Left Bank	Material	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	
		Bank Modification(s)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	
		Marginal and bank feature(s)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	
	Channel	Channel substrate	SI	SI	SI	SI	SI	SI	SI	SI	GP	SI	
		Flow-type	NP	NP	NP	NP	NP	SM	NP	SM	SM	NP	
		Channel modification(s)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	
		Channel features(s)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	
	Right Bank	Material	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	
		Bank Modification(s)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	
		Marginal and bank feature(s)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	
F. Bank top Land-use and	Land-use within 5m of Left Bank top		IG	IG	IG	IG	IG	IG	TH	SU	SU	BP	

Vegetation Structure	Left Bank top (structure within 1m)		U	U	U	U	S	S	S	B	B	C
	Left Bank-Face (structure)		B	S	B	U	S	U	U	B	S	B
	Right Bank-Face (structure)		U	S	U	U	B	S	S	U	U	S
	Right Bank top (structure within 1m)		C	S	C	C	C	C	C	S	S	S
	Land-use within 5m of Right Bank top		TL	TL	BL	BL	BL	BL	BL	BP	BP	BP
G. Channel Vegetation Types			more than 33% of area - Emergent reeds/sedges/rushes/grasses/horsetails Present - Emergent Broad-leaved herbs									
H. Land-use within 50m of Bank top	Left Bank		More than 33% - Improved/semi-improved grassland (IG) Broadleaf/mixed woodland (semi-natural) (BL) Tall herb/rank vegetation (TH) Suburban/urban development (SU)									
	Right Bank		More than 33% - Broadleaf/mixed woodland (semi-natural) (BL) Broadleaf/mixed plantation (BP) Improved/semi-improved grassland (IG) Tilled land (TL)									
I. Bank Profiles	Left Bank		More than 33% - Gentle Vertical/undercut									
	Right Bank		More than 33% - Gentle Vertical/undercut									
J. Extent of Trees and Associated Features	Left Bank		Trees - Occasional clumps, Semi-continuous									
	Right Bank		Trees - Semi-continuous									
	Associated Features	Present	Shading of channel Overhanging boughs Large woody debris									
		E (less than 33%)	N/A									
K. Extent of Channel and Bank Features	Present		Rippled flow Smooth Flow									
	E (More than 33%)		No perceptible flow									
L. Channel Dimensions	Left Bank	Bank top height (m)	1.00									
		Is Bank top height also bankfull height?	No									
		Embanked height (m)	N/A									
	Channel	Bankfull width (m)	2.50									
		Water width (m)	1.00									
		Water depth (m)	0.10									
	Right Bank	Bank top height (m)	0.50									

		Is Bank top height also bankfull height?	Yes
		Embanked height (m)	N/A
	Bed material at site is:		Unconsolidated (loose)
M. Features of Special Interest			None
N. Choked Channel			No
O. Notable Nuisance Plant Species			None
P. Overall Characteristics	Major Impacts:		N/A
	Other Observations:		Small local watercourse culverted under existing railway. Little or no evidence of other management or damaging impacts.
Q. Alders			Present

Key: BL = Broadleaf/mixed woodland, SC = Scrub, TL = Tilled land, CP = Coniferous/plantation, OR = Orchard, TH = Tall herbs, WL = Wetland, RP = Rough pasture, OW = Open water, MH = Moorland/heath, IG = Improved grassland, SU = Suburban/urban, RS = Rock & scree, NO = none, RS = re-sectioned, RI = reinforced, PC = poached, EM = embanked, SI = silt/mud, AR = artificial, UW = unbroken standing wave, RP = rippled, SM = smooth, NP = no perceptible flow, FO = ford, MB = un-vegetated mid channel bar, VB = vegetated mid channel bar

Table 21: River Habitat Survey data sheet for Section 2, Bayleys Brook

A. Field Survey Details	Ecology survey code		040-RH1-149001 - Section 2										
	Name of watercourse		Bayleys Brook										
	Surveyor(s)		FM										
	Survey start (24 hr. clock)		12:30										
	OS grid reference	Start section	SP 25414 77653										
		End section	SP 24306 78044										
	Date		05 June 2013										
	Photo reference(s)		BB 2.1, 2.2, 2.3										
	River or Artificial Channel		River										
	Is the riverbed visible												
B. Predominant Valley Form			Shallow vee										
C. Number of Riffles, Pools and Point Bars	Riffle(s)		0										
	Pool(s)		0										
	Un-vegetated point bar(s)		0										
	Vegetated point bar(s)		0										
D. Artificial Features	Channel realigned		No										
	Channel over-deepened		No										
	water impounded by weir/dam		No										
	Other		2 Minor Bridges										
E. Physical Attributes	Left Bank	Material	GA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA
		Bank Modification(s)	RS RI	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
		Marginal and bank feature(s)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
	Channel	Channel substrate	SI	GP	SI	GP	SI	SI	SI	SI	SI	SI	SI
		Flow-type	NP	SM	NP	SM	SM	SM	NP	NP	NP	SM	SM
		Channel modification(s)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
		Channel features(s)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
	Right Bank	Material	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA
		Bank Modification(s)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
		Marginal and bank feature(s)	NO	NO	NO	NO	NO	NO	NO	NO	NO	VS	VS
F. Bank top Land-use and	Land-use within 5m of Left Bank top		PG	AW	PG	AW	IG	IG	IG	IG	IG	IG	IG

Vegetation Structure	Left Bank top (structure within 1m)		U	U	S	C	S	S	U	S	U	U
	Left Bank-Face (structure)		S	S	S	S	S	S	S	S	B	S
	Right Bank-Face (structure)		S	S	C	S	S	S	S	S	B	S
	Right Bank top (structure within 1m)		S	C	U	C	C	C	C	C	S	U
	Land-use within 5m of Right Bank top		IG	IG	IG	IG	IG	IG	IG	BP	IG	IG
G. Channel Vegetation Types			None									
H. Land-use within 50m of Bank top	Left Bank		More than 33% Improved/semi-improved grassland (IG) Artificial open water (AW) Parkland or gardens (PG)									
	Right Bank		More than 33% Improved/semi-improved grassland (IG) Broadleaf/mixed woodland (semi-natural) (BL)									
I. Bank Profiles	Left Bank		More than 33% - Gentle Vertical/undercut Reinforced - toe only									
	Right Bank		More than 33% - Gentle Vertical/undercut									
J. Extent of Trees and Associated Features	Left Bank		Trees - Occasional clumps, Semi-continuous									
	Right Bank		Trees - Semi-continuous									
	Associated Features	Present	Shading of channel Overhanging boughs Large woody debris									
		E (less than 33%)	N/A									
K. Extent of Channel and Bank Features	Present		N/A									
	E (More than 33%)		Smooth flow No perceptible flow									
L. Channel Dimensions	Left Bank	Bank top height (m)	1.00									
		Is Bank top height also bankfull height?	Yes									
		Embanked height (m)	N/A									
	Channel	Bankfull width (m)	4.00									
		Water width (m)	1.00									
		Water depth (m)	0.10									
	Right Bank	Bank top height (m)	1.00									
		Is Bank top height also bankfull	Yes									

		height?	
		Embanked height (m)	N/A
	Bed material at site is:		Unconsolidated (loose)
M. Features of Special Interest			None
N. Choked Channel			No
O. Notable Nuisance Plant Species			None
P. Overall Characteristics	Major Impacts:		No
	Other Observations:		Small watercourse passing through farmland and fishing lakes, little or no evidence of impacts or damaging management.
Q. Alders			Present

Key: BL = Broadleaf/mixed woodland, SC = Scrub, TL = Tilled land, CP = Coniferous/plantation, OR = Orchard, TH = Tall herbs, WL = Wetland, RP = Rough pasture, OW = Open water, MH = Moorland/heath, IG = Improved grassland, SU = Suburban/urban, RS = Rock & scree, NO = none, RS = re-sectioned, RI = reinforced, PC = poached, EM = embanked, SI = silt/mud, AR = artificial, UW = unbroken standing wave, RP = rippled, SM = smooth, NP = no perceptible flow, FO = ford, MB = un-vegetated mid channel bar, VB = vegetated mid channel bar

Table 22: River Habitat Survey data sheet for Section 3, Bayleys Brook

A Field Survey Details	Ecology survey code		040-RH1-149002 - Section 3										
	Name of watercourse		Bayleys Brook										
	Surveyor(s)		FM										
	Survey start (24 hr. clock)		13:45										
	OS grid reference	Start section	SP 24310 78096										
		End section	SP 24155 78368										
	Date		05 June 2013										
	Photo reference(s)		3.1, 3.2, 3.3										
	River or Artificial Channel		River										
	Is the riverbed visible		Entirely										
B. Predominant Valley Form			Shallow vee										
C. Number of Riffles, Pools and Point Bars	Riffle(s)		0										
	Pool(s)		0										
	Un-vegetated point bar(s)		0										
	Vegetated point bar(s)		0										
D. Artificial Features	Channel realigned		No										
	Channel over-deepened		No										
	water impounded by weir/dam		No										
	Other		None										
E. Physical Attributes	Left Bank	Material	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	
		Bank Modification(s)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	
		Marginal and bank feature(s)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	
	Channel	Channel substrate	SI	SI	SI	GP	GP	GP	GP	GP	GP	GP	
		Flow-type	NP	SM	NP	RP	RP	SM	SM	RP	SM		
		Channel modification(s)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	
		Channel features(s)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	
	Right Bank	Material	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	
		Bank Modification(s)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	
		Marginal and bank feature(s)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	
F. Bank top Land-use and Vegetation	Land-use within 5m of Left Bank top		IG	IG	IG	IG	TL	TL	TL	TL	TL		

Structure	Left Bank top (structure within 1m)		S	U	U	U	C	S	C	S	C	
	Left Bank-Face (structure)		S	S	C	S	S	S	U	C	B	
	Right Bank-Face (structure)		B	B	S	S	S	S	S	S	S	
	Right Bank top (structure within 1m)		S	U	U	S	U	S	S	S	S	
	Land-use within 5m of Right Bank top		IG	IG	IG	IG	IG	TL	IG	IG	IG	
G. Channel Vegetation Types			None									
H. Land-use within 50m of Bank top	Left Bank											
	Right Bank											
I. Bank Profiles	Left Bank		More than 33% - Gentle Vertical/undercut Reinforced - toe only									
	Right Bank		More than 33% - Gentle Vertical/undercut									
J. Extent of Trees and Associated Features	Left Bank		Trees - Occasional clumps									
	Right Bank		Trees - Semi-continuous									
	Associated Features	Present	Shading of channel Overhanging boughs Large woody debris									
		E (less than 33%)	N/A									
K. Extent of Channel and Bank Features	Present		Rippled flow No perceptible flow									
	E (More than 33%)		Smooth flow No perceptible flow									
L. Channel Dimensions	Left Bank	Bank top height (m)	1.25									
		Is Bank top height also bankfull height?	Yes									
		Embanked height (m)	N/A									
	Channel	Bankfull width (m)	6.00									
		Water width (m)	2.00									
		Water depth (m)	0.05									
	Right Bank	Bank top height (m)	1.25									
		Is Bank top height also bankfull height?	Yes									
		Embanked height (m)	N/A									

	Bed material at site is:	Unconsolidated (loose)
M. Features of Special Interest		None
N. Choked Channel		No
O. Notable Nuisance Plant Species		None
P. Overall Characteristics	Major Impacts:	No
	Other Observations:	Small lowland watercourse, low energy and little water at the time of survey. No obvious signs of impact or poor management
Q. Alders		Present

Key: BL = Broadleaf/mixed woodland, SC = Scrub, TL = Tilled land, CP = Coniferous/plantation, OR = Orchard, TH = Tall herbs, WL = Wetland, RP = Rough pasture, OW = Open water, MH = Moorland/heath, IG = Improved grassland, SU = Suburban/urban, RS = Rock & scree, NO = none, RS = re-sectioned, RI = reinforced, PC = poached, EM = embanked, SI = silt/mud, AR = artificial, UW = unbroken standing wave, RP = rippled, SM = smooth, NP = no perceptible flow, FO = ford, MB = un-vegetated mid channel bar, VB = vegetated mid channel bar.

River Blythe SSSI west of Hampton-in-Arden (CFA23)

- 6.4.2 This section of river is between 9m and 13m in width. It is generally shallow with some deeper pooled areas, though there are no obvious signs of previous realignment or over-deepening within the channel, and the watercourse is not impounded by a weir or dam. Erosional and depositional features are limited to a small number of riffles and a point bar. Patrick Bridge is classed as a 'major' bridge within this section of the river, and one additional artificial feature (a minor outfall) was also recorded. The dominant surrounding land use is improved grassland/pasture. No invasive species were recorded within any of the sections, nor were any features of special interest. Flow type is generally smooth, and associated vegetation is dominated by emergent reeds/ sedges, rushes, grasses and horsetails.
- 6.4.3 Two sections of the River Blythe SSSI were surveyed west of Hampton-in-Arden using RHS. Survey results are shown in Table 23 and Table 24.

Table 23: River Habitat Survey data sheet for Section 1, River Blythe SSSI

A. Field Survey Details	Ecology survey code		040-RH1-153001 - Section 1										
	Name of watercourse		River Blythe SSSI										
	Surveyor(s)		FM										
	Survey start (24 hr. clock)		16:00										
	OS grid reference	Start section	SP 21556 81084										
		End section	SP 21386 81488										
	Date		05 June 2013										
	Photo reference(s)		RB 4.1, 4.2, 4.3, 4.4										
	River or Artificial Channel		River										
B. Predominant Valley Form			No obvious valley sides										
C. Number of Riffles, Pools and Point Bars	Riffle(s)		2										
	Pool(s)		0										
	Un-vegetated point bar(s)		1										
	Vegetated point bar(s)		0										
D. Artificial Features	Channel realigned		No										
	Channel over-deepened		No										
	Water impounded by weir/dam		No										
	Other		1 Major Bridge, 1 Minor Ford										
E. Physical Attributes	Left Bank	Material	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA
		Bank Modification(s)	NO	PC	NO	NO	NO	NO	NO	NO	NO	NO	NO
		Marginal and bank feature(s)	NO	NO	NO	NO	NO	NO	NO	NO	EC	EC	EC
	Channel	Channel substrate	GP	GP	SI	SI	GP	GP	GP	SI	SI	SI	SI
		Flow-type	SM	SM	SM	SM	RP	RP	SM	SM	SM	SM	SM
		Channel modification(s)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
		Channel features(s)	NO	NO	NO	NO	NO	NO	VB	NO	NO	NO	NO
	Right Bank	Material	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA
		Bank Modification(s)	NO	NO	NO	NO	PC	NO	NO	NO	NO	NO	NO
		Marginal and bank feature(s)	NO	NO	EC	NO	NO	NO	VS	NO	VS	NO	NO
F. Bank top Land-use and Vegetation			Land-use within 5m of Left Bank top	IG	IG	IG	IG	IG	IG	IG	IG	IG	IG

Structure	Left Bank top (structure within 1m)		U	U	U	U	U	U	U	S	S	S
	Left Bank-Face (structure)		S	S	S	S	S	S	S	S	B	B
	Right Bank-Face (structure)		S	S	B	S	B	S	S	S	S	S
	Right Bank top (structure within 1m)		U	U	U	U	U	U	U	U	U	U
	Land-use within 5m of Right Bank top		IG	IG	IG	IG	IG	IG	IG	IG	IG	IG
G. Channel Vegetation Types			Emergent reeds/sedges/rushes/grasses/horsetails Emergent broad-leaved herbs									
H. Land-use within 50m of Bank top	Left Bank		More than 33% - Improved/semi-improved grassland (IG) Suburban/urban development (SU)									
	Right Bank		More than 33% - Improved/semi-improved grassland (IG) Suburban/urban development (SU)									
I. Bank Profiles	Left Bank		Vertical/undercut Vertical with toe Steep (more than 45%) Gentle Poached bank Reinforced - toe only									
	Right Bank		Vertical/undercut Vertical with toe Steep (more than 45%) Gentle Poached bank Reinforced - toe only									
J. Extent of Trees and Associated Features	Left Bank		Trees - Isolated/scattered									
	Right Bank		Trees - Isolated/scattered									
	Associated Features	Present	Shading of channel Fallen trees Large woody debris									
		E (less than 33%)	N/A									
K. Extent of Channel and Bank Features	Present		Rippled flow Stable cliff(s)									
	E (More than 33%)		Smooth flow No perceptible flow									
L. Channel Dimensions	Left Bank	Bank top height (m)	1.00									
		Is Bank top height also bankfull height?	Yes									
		Embanked height (m)	N/A									
	Channel	Bankfull width (m)	16.00									
		Water width (m)	9.00									

		Water depth (m)	0.20
	Right Bank	Bank top height (m)	1.00
		Is Bank top height also bankfull height?	Yes
		Embanked height (m)	N/A
	Bed material at site is:		Unconsolidated (loose)
M. Features of Special Interest			None
N. Choked Channel			No
O. Notable Nuisance Plant Species			None
P. Overall Characteristics	Major Impacts:		No
	Other Observations:		Slow flowing river through grazed/improved grasslands, unmanaged with only a little poaching
Q. Alders			Present

Key: BL = Broadleaf/mixed woodland, SC = Scrub, TL = Tilled land, CP = Coniferous/plantation, OR = Orchard, TH = Tall herbs, WL = Wetland, RP = Rough pasture, OW = Open water, MH = Moorland/heath, IG = Improved grassland, SU = Suburban/urban, RS = Rock & scree, NO = none, RS = re-sectioned, RI = reinforced, PC = poached, EM = embanked, SI = silt/mud, AR = artificial, UW = unbroken standing wave, RP = rippled, SM = smooth, NP = no perceptible flow, FO = ford, MB = un-vegetated mid channel bar, VB = vegetated mid channel bar

Table 24: River Habitat Survey data sheet for Section 2, River Blythe SSSI

A. Field Survey Details	Ecology survey code		040-RS2-154001 - Section 2										
	Name of watercourse		River Blythe SSSI										
	Surveyor(s)		FM										
	Survey start (24 hr. clock)		11:40										
	OS grid reference	Start section	SP 21350 81508										
		End section	SP 21483 81729										
	Date		06 June 2013										
	Photo reference(s)		RB 5.1, 5.2										
	River or Artificial Channel		River										
B. Predominant Valley Form			No obvious valley sides										
C. Number of Riffles, Pools and Point Bars	Riffle(s)		0										
	Pool(s)		0										
	Un-vegetated point bar(s)		0										
	Vegetated point bar(s)		0										
D. Artificial Features	Channel realigned		No										
	Channel over-deepened		No										
	Water impounded by weir/dam		No										
	Other		1 Minor Outfall/intake										
E. Physical Attributes	Left Bank	Material	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA
		Bank Modification(s)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
		Marginal and bank feature(s)	NO	NO	SC	NO	NO	NO	NO	NO	NO	NO	NO
	Channel	Channel substrate	GP	GP	SI	SI	SI	SI	SI	SI	SI	SI	SI
		Flow-type	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM
		Channel modification(s)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
		Channel features(s)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
	Right Bank	Material	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA
		Bank Modification(s)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
		Marginal and bank feature(s)	NO	NO	NO	VS	NO	NO	NO	VS	NO	VS	VS
F. Bank top Land-use and Vegetation			Land-use within 5m of Left Bank top	IG	IG	IG	NV	NV	IG	NV	TH	TH	TH

Structure	Left Bank top (structure within 1m)		S	S	S	NV	NV	S	NV	S	S	S
	Left Bank-Face (structure)		S	S	C	S	C	S	C	C	C	S
	Right Bank-Face (structure)		S	S	B	S	S	B	S	S	S	B
	Right Bank top (structure within 1m)		S	S	S	S	S	S	S	S	S	S
	Land-use within 5m of Right Bank top		IG	IG	IG	IG	IG	IG	IG	IG	IG	IG
G. Channel Vegetation Types			None Emergent reeds/sedges/rushes/grasses/horsetails Floating-leaved (rooted)									
H. Land-use within 50m of Bank top	Left Bank		More than 33% - Improved/semi-improved grassland (IG)									
	Right Bank		More than 33% - Improved/semi-improved grassland (IG) Broadleaf/mixed woodland (semi-natural) (BL) Tall herb/rank vegetation (TH)									
I. Bank Profiles	Left Bank		More than 33% Steep (more than 45%) Vertical/undercut Gentle Poached bank Reinforced - whole									
	Right Bank		More than 33% Steep (more than 45%) Vertical/undercut Gentle Poached bank									
J. Extent of Trees and Associated Features	Left Bank		Trees - occasional clumps									
	Right Bank		Trees - Isolated/scattered									
	Associated Features	Present	Shading of channel Overhanging boughs Exposed bankside roots Fallen trees Large woody debris									
		E (less than 33%)	N/A									
K. Extent of Channel and Bank Features	Present		Upwelling Marginal deadwater Stable cliff(s)									
	E (More than 33%)		Smooth flow No perceptible flow									
L. Channel Dimensions	Left Bank	Bank top height (m)	2.00									
		Is Bank top height also bankfull height?	Yes									
		Embanked height (m)	N/A									
	Channel	Bankfull width (m)	18.00									
		Water width (m)	13.00									

		Water depth (m)	0.20
	Right Bank	Bank top height (m)	2.00
		Is Bank top height also bankfull height?	Yes
		Embanked height (m)	N/A
	Bed material at site is:		Unconsolidated (loose)
M. Features of Special Interest			Debris dam(s) Backwater(s)
N. Choked Channel			No
O. Notable Nuisance Plant Species			None
P. Overall Characteristics	Major Impacts:		No
	Other Observations:		Slow flowing/low energy channel, with little management or impact present. Evidence of past cattle poaching.
Q. Alders			Present

Key: BL = Broadleaf/mixed woodland, SC = Scrub, TL = Tilled land, CP = Coniferous/plantation, OR = Orchard, TH = Tall herbs, WL = Wetland, RP = Rough pasture, OW = Open water, MH = Moorland/heath, IG = Improved grassland, SU = Suburban/urban, RS = Rock & scree, NO = none, RS = re-sectioned, RI = reinforced, PC = poached, EM = embanked, SI = silt/mud, AR = artificial, UW = unbroken standing wave, RP = rippled, SM = smooth, NP = no perceptible flow, FO = ford, MB = un-vegetated mid channel bar, VB = vegetated mid channel bar

Shadow Brook, either side of Diddington within the Balsall Common and Hampton-in-Arden area (CFA23)

- 6.4.4 Water width was generally less than 2m, passing through tilled land, but with broadleaved woodland and tall herb immediately adjacent to the channel. No obvious signs of previous realignment or over-deepening; not impounded by a weir or dam. Erosional and depositional features generally absent. The channel enters a culvert under Diddington Lane. No invasive species present, one feature of special interest is a debris dam. Flow type generally smooth or non-perceptible, and channel vegetation largely absent.
- 6.4.5 A single section of Shadow Brook was surveyed using RHS as shown in Table 25.

Table 25: River Habitat Survey data sheet for Shadow Brook

A. Field Survey Details	Ecology survey code		040-RH1-155001										
	Name of watercourse		Shadow Brook										
	Surveyor(s)		FM										
	Survey start (24 hr. clock)		13:30										
	OS grid reference	Start section	SP 20915 82417										
		End section	SP 21346 82352										
	Date		06 June 2013										
	Photo reference(s)		7.1, 7.2, 7.3										
	River or Artificial Channel		River										
	Is the riverbed visible		Entirely										
B. Predominant Valley Form			Shadow vee										
C. Number of Riffles, Pools and Point Bars	Riffle(s)		0										
	Pool(s)		0										
	Un-vegetated point bar(s)		0										
	Vegetated point bar(s)		0										
D. Artificial Features	Channel realigned		No										
	Channel over-deepened		No										
	Water impounded by weir/dam		No										
	Other		1 Major Culvert										
E. Physical Attributes	Left Bank	Material	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA
		Bank Modification(s)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
		Marginal and bank feature(s)	NO	NO	NO	NO	EC	NO	NO	NO	NO	NO	NO
	Channel	Channel substrate	SI	SI	SI	SI	GP	SI	SI	SI	SI	SI	SI
		Flow-type	SM	SM	NP	SM	SM	NP	NP	RP	NP	SM	SM
		Channel modification(s)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
		Channel features(s)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
	Right Bank	Material	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA
		Bank Modification(s)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
		Marginal and bank feature(s)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
F. Bank top Land-use and	Land-use within 5m of Left Bank top		TL	TL	TH	TH	TH	TH	IG	IG	IG	IG	IG

Vegetation Structure	Left Bank top (structure within 1m)		B	B	S	S	C	S	S	S	S	S
	Left Bank-Face (structure)		S	C	S	S	B	S	C	C	S	S
	Right Bank-Face (structure)		C	C	S	S	S	S	S	S	S	S
	Right Bank top (structure within 1m)		U	S	C	C	C	C	S	S	S	S
	Land-use within 5m of Right Bank top		TL	TL	BL	BL	BL	BL	TH	TH	IG	SH
G. Channel Vegetation Types			None Floating-leaved (rooted)									
H. Land-use within 50m of Bank top	Left Bank		More than 33% - Improved/semi-improved grassland (IG) More than 33% - Tall herb/rank vegetation (TH) More than 33% - Tilled land (TL) Broadleaf/mixed woodland (semi-natural) (BL) Scrub and shrubs (SH)									
	Right Bank		More than 33% - Broadleaf/mixed woodland (semi-natural) (BL) More than 33% - Tilled land (TL) Scrub and shrubs (SH) Improved/semi-improved grassland (IG) Tall herb/rank vegetation (TH)									
I. Bank Profiles	Left Bank		More than 33% Steep (more than 45%) Vertical/undercut Gentle Reinforced - whole									
	Right Bank		More than 33% Steep (more than 45%) Gentle Reinforced - whole									
J. Extent of Trees and Associated Features	Left Bank		Trees - Occasional clumps									
	Right Bank		Trees - Semi-continuous									
	Associated Features	Present	Exposed bankside roots Fallen trees Large woody debris									
		E (less than 33%)	Shading of channel									
K. Extent of Channel and Bank Features	Present		Rippled flow Stable cliff(s)									
	E (More than 33%)		Smooth flow No perceptible flow									
L. Channel Dimensions	Left Bank	Bank top height (m)	1.50									
		Is Bank top height also bankfull height?	Yes									
		Embanked height (m)	N/A									
	Channel	Bankfull width (m)	6.00									

		Water width (m)	2.00
		Water depth (m)	0.30
	Right Bank	Bank top height (m)	1.50
		Is Bank top height also bankfull height?	Yes
		Embanked height (m)	N/A
	Bed material at site is:		Unconsolidated (loose)
M. Features of Special Interest			Debris dam(s)
N. Choked Channel			No
O. Notable Nuisance Plant Species			None
P. Overall Characteristics	Major Impacts:		No
	Other Observations:		Small watercourse in middle of arable area. No obvious signs of previous management. Watercourse surrounded by mature trees.
Q. Alders			Present

Key: BL = Broadleaf/mixed woodland, SC = Scrub, TL = Tilled land, CP = Coniferous/plantation, OR = Orchard, TH = Tall herbs, WL = Wetland, RP = Rough pasture, OW = Open water, MH = Moorland/heath, IG = Improved grassland, SU = Suburban/urban, RS = Rock & scree, NO = none, RS = re-sectioned, RI = reinforced, PC = poached, EM = embanked, SI = silt/mud, AR = artificial, UW = unbroken standing wave, RP = rippled, SM = smooth, NP = no perceptible flow, FO = ford, MB = un-vegetated mid channel bar, VB = vegetated mid channel bar

River Blythe SSSI, immediately to the west of the Stonebridge island within the Birmingham Interchange and Chelmsley Wood area (CFA24)

- 6.4.6 The width of this watercourse is approximately 5m and the section surveyed passes through arable and pasture land. No obvious signs of previous realignment or over-deepening were recorded and the watercourse is not impounded by a weir or dam. Erosional and depositional features (pools, riffles, and point bars) are generally absent though two earth cliffs and natural berms are present. The channel enters a culvert under the A45 Coventry Road. No invasive species were recorded though a debris dam was noted as a feature of special interest. Flow type is generally smooth and the vegetation is dominated by emergent broad-leaved herbs. One section of the River Blythe SSSI immediately to the west of the Stonebridge island was surveyed using RHS as shown in Table 26.

Table 26: River Habitat Survey data sheet for River Blythe SSSI

A. Field Survey Details	Ecology survey code		040-RH1-155002										
	Name of watercourse		River Blythe SSSI										
	Surveyor(s)		KP										
	Survey start (24 hr. clock)		16:00										
	OS grid reference	Start section	SP 21397 83209										
		End section	SP 21472 83654										
	Date		10 June 2013										
	Photo reference(s)		8.1, 8.1, 8.3										
	River or Artificial Channel		River										
	Is the riverbed visible		Partially										
B. Predominant Valley Form			No obvious valley sides										
C. Number of Riffles, Pools and Point Bars	Riffle(s)		1										
	Pool(s)		0										
	Un-vegetated point bar(s)		0										
	Vegetated point bar(s)		0										
D. Artificial Features	Channel realigned		No										
	Channel over-deepened		No										
	Water impounded by weir/dam		No										
	Other		1 Major Culvert 11 Minor Bridge 1 Minor Ford										
E. Physical Attributes	Left Bank	Material	EP	EP	EP	EP	EP	EP	EP	EP	EP	EP	EP
		Bank Modification(s)	NK	NK	NK	NK	NK	NK	NK	NO	NO	NO	NO
		Marginal and bank feature(s)	NV	NO	NB	NO	NB	NV	NV	NV	NO	NB	NO
	Channel	Channel substrate	GP	GP	GP	NV	NV	NV	NV	NV	NV	NV	NV
		Flow-type	RP	RP	SM	SM	SM	SM	SM	SM	SM	SM	SM
		Channel modification(s)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
		Channel features(s)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
	Right Bank	Material	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA
		Bank Modification(s)	NK	NK	NK	NK	NK	NK	NK	NK	NO	EC	EC

		Marginal and bank feature(s)	VS	NB	EC	NO	EC	NB	NO	NO	NO	NO
F. Bank top Land-use and Vegetation Structure	Land-use within 5m of Left Bank top		TL	TL	TL	TL	TH	TL	TL	SU	IG	TH
	Left Bank top (structure within 1m)		S	S	S	S	S	S	S	C	S	S
	Left Bank-Face (structure)		S	S	S	S	S	S	S	C	S	S
	Right Bank-Face (structure)		S	S	S	S	B	S	B	S	B	R
	Right Bank top (structure within 1m)		S	S	S	S	S	S	S	S	S	S
	Land-use within 5m of Right Bank top		IG	IG	IG	IG	IG	IG	IG	IG	IG	IG
G. Channel Vegetation Types			Emergent broad-leaved herbs Submerged linear-leaved									
H. Land-use within 50m of Bank top	Left Bank		More than 33% - Tilled land (TL) Broadleaf/mixed woodland (semi-natural) (BL) Scrub and shrubs (SH) Improved/semi-improved grassland (IG) Tall herb/rank vegetation (TH)									
	Right Bank		More than 33% - Tilled land (TL) Broadleaf /mixed woodland (semi-natural) (BL) Scrub and shrubs (SH) Improved/semi-improved grassland (IG) Tall herb/rank vegetation (TH)									
I. Bank Profiles	Left Bank		Vertical/undercut Vertical with toe Steep (more than 45) Natural berm Re-sectioned (re-profiled)									
	Right Bank		Vertical/undercut Steep (more than 45) Gentle Natural berm Re-sectioned (re-profiled) Embanked									
J. Extent of Trees and Associated Features	Left Bank		Trees - Occasional clumps									
	Right Bank		Trees - Isolated/scattered									
	Associated Features	Present	Shading of channel Overhanging boughs Fallen trees Large woody debris									
		E (less than 33%)	None									
K. Extent of Channel and Bank Features	Present		Rippled flow Eroding cliff(s)									
	E (More than 33%)		Smooth flow									

L. Channel Dimensions	Left Bank	Bank top height (m)	1.50
		Is Bank top height also bankfull height?	Yes
		Embanked height (m)	N/A
	Channel	Bankfull width (m)	10.00
		Water width (m)	5.00
		Water depth (m)	0.30
	Right Bank	Bank top height (m)	1.00
		Is Bank top height also bankfull height?	No
		Embanked height (m)	1.50
	Bed material at site is:		Unconsolidated (loose)
M. Features of Special Interest			Debris dam(s)
N. Choked Channel			No
O. Notable Nuisance Plant Species			None
P. Overall Characteristics	Major Impacts:		No
	Other Observations:		Watercourse flows through managed arable/pasture land. Areas of natural berms identified along right bank which suggest watercourse historically has been over deepened. Embanked section on right bank of road arable. Many areas of eroding cliffs were identified.
Q. Alders			Present

Key: BL = Broadleaf/mixed woodland, SC = Scrub, TL = Tilled land, CP = Coniferous/plantation, OR = Orchard, TH = Tall herbs, WL = Wetland, RP = Rough pasture, OW = Open water, MH = Moorland/heath, IG = Improved grassland, SU = Suburban/urban, RS = Rock & scree, NO = none, RS = re-sectioned, RI = reinforced, PC = poached, EM = embanked, SI = silt/mud, AR = artificial, UW = unbroken standing wave, RP = rippled, SM = smooth, NP = no perceptible flow, FO = ford, MB = un-vegetated mid channel bar, VB = vegetated mid channel bar

Hollywell Brook, immediately to the north of Middle Bickenhill within the Birmingham Interchange and Chelmsley Wood area (CFA24)

6.4.7 The width of this watercourse in this location is generally 0.75-1.0m and it passing through tilled land and pasture. There are obvious signs of previous realignment or over-deepening over significant lengths of the watercourse. Erosional and depositional features are generally absent with only one riffle recorded. Culverts, bridges and fords have impacted upon the channel at various locations along the length of the watercourse in this section and frequent poaching of the embankments by cattle was record. Emergent reeds dominate areas of the channel No invasive species were recorded. Two features of special interest include a debris dam and a fringed reed bank. Flow type is generally smooth, and associated vegetation is

dominated by emergent reeds, sedges, rushes, grasses and horsetails. Three sections of Hollywell Brook, immediately to the north of Middle Bickenhill were surveyed using RHS. Survey results for the sections are shown in Table 27, Table 28 and Table 29.

Table 27: River Habitat Survey data sheet for Section 1, Hollywell Brook

A. Field Survey Details	Ecology survey code		040-RH1-156001 - Section 1										
	Name of watercourse		Hollywell Brook										
	Surveyor(s)		KP										
	Survey start (24 hr. clock)		15:00										
	OS grid reference	Start section	SP 21079 83618										
		End section	SP 20760 83539										
	Date		10-Jun-13										
	Photo reference(s)		11.1, 11.2, 11.3										
	River or Artificial Channel		River										
Is the riverbed visible		Partially											
B. Predominant Valley Form			Shallow vee										
C. Number of Riffles, Pools and Point Bars	Riffle(s)		1										
	Pool(s)		0										
	Un-vegetated point bar(s)		0										
	Vegetated point bar(s)		0										
D. Artificial Features	Channel realigned		No										
	Channel over-deepened		Yes, less than 33% of site										
	water impounded by weir/dam		No										
	Other		1 Major Culvert 2 Minor Bridges 1 Minor Ford										
E. Physical Attributes	Left Bank	Material	EA	EA	EA	EA	EA	EA	EA	EA			
		Bank Modification(s)	PC	RS	RS	RS	RS	RS	NO	NO			
		Marginal and bank feature(s)	NO	NB	NO	NO	NO	NO	NO	NO			
	Channel	Channel substrate	GP	GP	GP	GP	GP	GP	GP	GP			
		Flow-type	SM	SM	RP	SM	SM	SM	SM	SM			
		Channel modification(s)	FO	NO	NO	NO	NO	NO	NO	NO			
		Channel features(s)	NO	NO	NO	NO	NO	NO	NO	NO			
	Right Bank	Material	EA	EA	EA	EA	EA	EA	EA	EA			
		Bank Modification(s)	PC	RS	RS	RS	RS	RS	NO	NO			
		Marginal and bank feature(s)	NO	NO	NO	NO	NO	NO	NO	NO			

F. Bank top Land-use and Vegetation Structure	Land-use within 5m of Left Bank top		IG	IG	IG	IG	IG	TH	IG	IG		
	Left Bank top (structure within 1m)		S	S	S	S	S	S	S	S		
	Left Bank-Face (structure)		S	S	S	S	S	S	S	S		
	Right Bank-Face (structure)		S	S	S	S	S	S	S	S		
	Right Bank top (structure within 1m)		S	S	S	S	S	S	S	S		
	Land-use within 5m of Right Bank top		TH	TL	TL	TL	IG	IG	IG	IG		
G. Channel Vegetation Types			More than 33% - Submerged linear-leaved Liverworts/mosses/lichens Emergent broad-leaved herbs Emergent reeds/sedges/rushes/grasses/horsetails Submerged fine-leaved									
H. Land-use within 50m of Bank top	Left Bank		More than 33% - Suburban/urban development (SU) More than 33% - Tilled land (TL) Scrub and shrubs (SH) Improved/semi-improved grassland (IG) Tall herb/rank vegetation (TH)									
	Right Bank		More than 33% - Suburban/urban development (SU) More than 33% - Tilled land (TL) Scrub and shrubs (SH) Improved/semi-improved grassland (IG) Tall herb/rank vegetation (TH)									
I. Bank Profiles	Left Bank		More than 33% - Re-sectioned (re-profiled) Steep Gentle Natural berm Poached bank									
	Right Bank		More than 33% - Re-sectioned (re-profiled) Steep Gentle Poached bank									
J. Extent of Trees and Associated Features	Left Bank		Trees - Occasional clumps									
	Right Bank		Trees - Isolated/scattered									
	Associated Features	Present	Shading of channel Exposed bankside roots									
		E (less than 33%)	None									
K. Extent of Channel and Bank Features	Present		Rippled flow Upwelling									
	E (More than 33%)		Smooth flow									
L. Channel Dimensions	Left Bank	Bank top height (m)	3.00									
		Is Bank top height also bankfull height?	Yes									

		Embanked height (m)	N/A
	Channel	Bankfull width (m)	2.00
		Water width (m)	0.75
		Water depth (m)	0.25
	Right Bank	Bank top height (m)	3.00
		Is Bank top height also bankfull height?	Yes
		Embanked height (m)	N/A
	Bed material at site is:		Unconsolidated (loose)
M. Features of Special Interest			None
N. Choked Channel			No
O. Notable Nuisance Plant Species			None
P. Overall Characteristics	Major Impacts:		Over deepening
	Other Observations:		Watercourse flow through heavily managed arable/pasture farm. Watercourse appeared to have been over deepened for drainage.
Q. Alders			Present

Key: BL = Broadleaf/mixed woodland, SC = Scrub, TL = Tilled land, CP = Coniferous/plantation, OR = Orchard, TH = Tall herbs, WL = Wetland, RP = Rough pasture, OW = Open water, MH = Moorland/heath, IG = Improved grassland, SU = Suburban/urban, RS = Rock & scree, NO = none, RS = re-sectioned, RI = reinforced, PC = poached, EM = embanked, SI = silt/mud, AR = artificial, UW = unbroken standing wave, RP = rippled, SM = smooth, NP = no perceptible flow, FO = ford, MB = un-vegetated mid channel bar, VB = vegetated mid channel bar

Table 28: River Habitat Survey data sheet for Section 2, Hollywell Brook

A. Field Survey Details	Ecology survey code		040-RH1-156002 - Section 2										
	Name of watercourse		Hollywell Brook										
	Surveyor(s)		KP										
	Survey start (24 hr. clock)		13:00										
	OS grid reference	Start section	SP 20308 83692										
		End section	SP 20716 83545										
	Date		10 June 2013										
	Photo reference(s)		10.1, 10.2, 10.3										
	River or Artificial Channel		River										
B. Predominant Valley Form			Shallow vee										
C. Number of Riffles, Pools and Point Bars	Riffle(s)		1										
	Pool(s)		0										
	Un-vegetated point bar(s)		0										
	Vegetated point bar(s)		0										
D. Artificial Features	Channel realigned		No										
	Channel over-deepened		Yes, More than 33% of site										
	water impounded by weir/dam		No										
	Other		1 Major Culvert 1 Minor Ford										
E. Physical Attributes	Left Bank	Material	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA
		Bank Modification(s)	NO	RS	RS	RS	RS	RS	RS	RS	RS	RS	RS
		Marginal and bank feature(s)	NO	NO	NO	NO	NB	NB	NB	NO	NO	NB	NB
	Channel	Channel substrate	GP	GP	GP	GP	GP	GP	GP	GP	GP	GP	GP
		Flow-type	SM	SM	RP	SM	SM	SM	SM	SM	SM	SM	SM
		Channel modification(s)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
		Channel features(s)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
	Right Bank	Material	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA
		Bank Modification(s)	NO	RS	RS	RS	RS	RS	PC	RS	RS	RS	RS
		Marginal and bank feature(s)	NO	NO	EC	NO	NB	EC	NO	NB	NB	NB	NB

F. Bank top Land-use and Vegetation Structure	Land-use within 5m of Left Bank top		IG	IG	IG	IG	IG	IG	IG	RU	RU	RU
	Left Bank top (structure within 1m)		S	S	S	S	S	S	S	S	S	S
	Left Bank-Face (structure)		S	S	S	S	S	S	S	S	S	S
	Right Bank-Face (structure)		S	S	S	S	S	B	S	S	S	S
	Right Bank top (structure within 1m)		S	S	S	S	S	S	S	S	S	S
	Land-use within 5m of Right Bank top		TH	IG	IG	IG	IG	IG	IG	IG	?	IG
G. Channel Vegetation Types			More than 33% - Emergent reeds/sedges/rushes/grasses/horsetails Liverworts/mosses/lichens Emergent broad-leaved herbs Submerged linear-leaved									
H. Land-use within 50m of Bank top	Left Bank		More than 33% - Improved/semi-improved grassland (IG) Scrub and shrubs (SH) Tall herb/rank vegetation (TH) Suburban/urban development (SU) Tilled land (TL)									
	Right Bank		More than 33% - Improved/semi-improved grassland (IG) Scrub and shrubs (SH) Tall herb/rank vegetation (TH) Suburban/urban development (SU) Tilled land (TL)									
I. Bank Profiles	Left Bank		More than 33% - Re-sectioned (re-profiled) Steep (more than 45) Gentle Natural berm Poached bank									
	Right Bank		More than 33% - Re-sectioned (re-profiled) Steep (more than 45) Gentle Natural berm Poached bank									
J. Extent of Trees and Associated Features	Left Bank		Trees - Isolated/scattered									
	Right Bank		Trees - Isolated/scattered									
	Associated Features	Present	Shading of channel Fallen trees Large woody debris Fallen trees Large woody debris									
		E (less than 33%)	None									
K. Extent of Channel and Bank Features	Present		Rippled flow No perceptible flow Eroding cliff(s)									
	E (More than 33%)		Smooth flow No perceptible flow									

L. Channel Dimensions	Left Bank	Bank top height (m)	0.75
		Is Bank top height also bankfull height?	No
		Embanked height (m)	N/A
	Channel	Bankfull width (m)	1.00
		Water width (m)	0.75
		Water depth (m)	0.10
	Right Bank	Bank top height (m)	2.50
		Is Bank top height also bankfull height?	Yes
		Embanked height (m)	N/A
	Bed material at site is:		Unconsolidated (loose)
M. Features of Special Interest			None
N. Choked Channel			Yes
O. Notable Nuisance Plant Species			None
P. Overall Characteristics	Major Impacts:		No
	Other Observations:		Watercourse heavily choked with emergent reeds and sedges. Evidence of poaching in natural berm was recorded where watercourse is naturally recovering from over deepening due to PPS management.
Q. Alders			Present

Key: BL = Broadleaf/mixed woodland, SC = Scrub, TL = Tilled land, CP = Coniferous/plantation, OR = Orchard, TH = Tall herbs, WL = Wetland, RP = Rough pasture, OW = Open water, MH = Moorland/heath, IG = Improved grassland, SU = Suburban/urban, RS = Rock & scree, NO = none, RS = re-sectioned, RI = reinforced, PC = poached, EM = embanked, SI = silt/mud, AR = artificial, UW = unbroken standing wave, RP = rippled, SM = smooth, NP = no perceptible flow, FO = ford, MB = un-vegetated mid channel bar, VB = vegetated mid channel bar

Table 29: River Habitat Survey data sheet for Section 3, Hollywell Brook

A. Field Survey Details	Ecology survey code		040-RH1-156003 - Section 3										
	Name of watercourse		Hollywell Brook										
	Surveyor(s)		KP										
	Survey start (24 hr. clock)		11:30										
	OS grid reference	Start section	SP 20283 83707										
		End section	SP 19924 83646										
	Date		10 June 2013										
	Photo reference(s)		9.1, 9.2, 9.3										
	River or Artificial Channel		River										
Is the riverbed visible		Partially											
B. Predominant Valley Form			Shallow vee										
C. Number of Riffles, Pools and Point Bars	Riffle(s)		0										
	Pool(s)		0										
	Un-vegetated point bar(s)		0										
	Vegetated point bar(s)		0										
D. Artificial Features	Channel realigned		Yes, less than 33% of site										
	Channel over-deepened		Yes, More than 33% of site										
	water impounded by weir/dam		No										
	Other		2 Major Culverts 3 Minor Outfalls/Intakes										
E. Physical Attributes	Left Bank	Material	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA
		Bank Modification(s)	RS	RS	RS	NO	RS	RS	RS	RS	RS	RS	RS
		Marginal and bank feature(s)	NO	NO	NO	NO	NO	NO	EC	NO	NO	NO	NO
	Channel	Channel substrate	GP	SI	SI	SI	SI	SI	GP	GP	SI	EA	
		Flow-type	SM	NP	NP	NP	SM	SM	SM	SM	SM	SM	SM
		Channel modification(s)	RS	RS	RS	NO	RS	RS	RS	RS	RS	RS	RS
		Channel features(s)	TR	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
	Right Bank	Material	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA
		Bank Modification(s)	RI	RS	RS	NO	RS	RS	RS	RS	RS	RS	RS
		Marginal and bank feature(s)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

F. Bank top Land-use and Vegetation Structure	Land-use within 5m of Left Bank top		IG	IG	IG	IG	IG	NV	NV	IG	IG	IG
	Left Bank top (structure within 1m)		B	S	C	C	S	S	C	S	S	S
	Left Bank-Face (structure)		B	S	S	S	S	S	B	U	S	S
	Right Bank-Face (structure)		B	S	S	S	B	S	B	S	S	S
	Right Bank top (structure within 1m)		S	S	S	S	S	S	B	S	S	S
	Land-use within 5m of Right Bank top		IG	SH	SH	IG	IG	IG	IG	IG	IG	IG
G. Channel Vegetation Types			None Emergent broad-leaved herbs Emergent reeds/sedges/rushes/grasses/horsetails Submerged broad-leaved									
H. Land-use within 50m of Bank top	Left Bank		More than 33% - Improved/semi-improved grassland (IG) Scrub and shrubs (SH) Artificial open water (AW) Tall herb/rank vegetation (TH) Suburban/urban development (SU)									
	Right Bank		More than 33% - Improved/semi-improved grassland (IG) Broadleaf/mixed plantation (BP) Scrub and shrubs (SH) Artificial open water (AW) Tall herb/rank vegetation (TH) Suburban/urban development (SU)									
I. Bank Profiles	Left Bank		More than 33% - Re-sectioned (re-profiled) Vertical/undercut Gentle Poached bank									
	Right Bank		More than 33% - Re-sectioned (re-profiled) Vertical/undercut Gentle Poached bank									
J. Extent of Trees and Associated Features	Left Bank		Trees - Occasional clumps									
	Right Bank		Trees - Occasional clumps									
	Associated Features	Present	Shading of channel Large woody debris Fallen trees Large woody debris									
		E (less than 33%)	None									
K. Extent of Channel and Bank Features	Present		Eroding cliff(s)									
	E (More than 33%)		Smooth flow No perceptible flow									
L. Channel Dimensions	Left Bank	Bank top height (m)	2.00									
		Is Bank top height also	No									

		bankfull height?	
		Embanked height (m)	N/A
	Channel	Bankfull width (m)	2.80
		Water width (m)	1.00
		Water depth (m)	0.25
	Right Bank	Bank top height (m)	2.00
		Is Bank top height also bankfull height?	No
		Embanked height (m)	N/A
	Bed material at site is:		Unconsolidated (loose)
M. Features of Special Interest			Debris dam(s) Fringing reed-bank(s)
N. Choked Channel			No
O. Notable Nuisance Plant Species			None
P. Overall Characteristics	Major Impacts:		Fisheries management
	Other Observations:		Large pond dug out (spot-check 1) causing flow to be impounded at location of water body. Evidence of Re-sectioned banks near motorway crossing (spot-check 10). Evidence of poaching, with some eroding banks.
Q. Alders			Present

Key: BL = Broadleaf/mixed woodland, SC = Scrub, TL = Tilled land, CP = Coniferous/plantation, OR = Orchard, TH = Tall herbs, WL = Wetland, RP = Rough pasture, OW = Open water, MH = Moorland/heath, IG = Improved grassland, SU = Suburban/urban, RS = Rock & scree, NO = none, RS = re-sectioned, RI = reinforced, PC = poached, EM = embanked, SI = silt/mud, AR = artificial, UW = unbroken standing wave, RP = rippled, SM = smooth, NP = no perceptible flow, FO = ford, MB = un-vegetated mid channel bar, VB = vegetated mid channel bar

River Tame SLINC within the Castle Bromwich and Bromford area (CFA25)

- 6.4.8 The width of this river in this location is generally 15m, with rough pasture to the south of the line and an existing railway immediately to the north of the channel. Obvious signs of previous realignment or over-deepening over significant lengths of the watercourse were recorded. Erosional and depositional features are generally absent, with just one riffle recorded at the downstream extent of the sections surveyed. Minor and major bridges cross the channel, and outfalls are also present. Invasive species Japanese knotweed and Indian balsam were recorded. No special features of interest were considered to be present. Flow type was generally smooth, and submerged linear vegetation was common along the sections surveyed.
- 6.4.9 Four sections of the River Tame SLINC, immediately to the north of Castle Bromwich were surveyed using RHS. The survey results are shown in Table 30, Table 31, Table 32 and Table 33.

Table 30: River Habitat Survey data sheet for Section 1, River Tame SLINC

A. Field Survey Details	Ecology survey code		040-RH1-166001 - Section 1									
	Name of watercourse		River Tame SLINC									
	Surveyor(s)		FM									
	Survey start (24 hr. clock)		14:00									
	OS grid reference	Start section	SP 16111 91077									
		End section	SP 16109 91046									
	Date		11 June 2013									
	Photo reference(s)		15.1, 15.2									
	River or Artificial Channel		River									
Is the riverbed visible		Entirely										
B. Predominant Valley Form			Asymmetrical valley									
C. Number of Riffles, Pools and Point Bars	Riffle(s)		1									
	Pool(s)		0									
	Un-vegetated point bar(s)		0									
	Vegetated point bar(s)		0									
D. Artificial Features	Channel realigned		No									
	Channel over-deepened		No									
	water impounded by weir/dam		No									
	Other		1 Major Bridge									
E. Physical Attributes	Left Bank	Material	EA	BR								
		Bank Modification(s)	RS	RI RS								
		Marginal and bank feature(s)	NO	NO								
	Channel	Channel substrate	GP	GP								
		Flow-type	SM	UW								
		Channel modification(s)	NO	NO								
		Channel features(s)	NO	MB								
	Right Bank	Material	EA	BR								
		Bank Modification(s)	NO	RI RS								
		Marginal and bank feature(s)	EC	NO								
F. Bank top Land-use and Vegetation	Land-use within 5m of Left Bank top		TH	SU								
	Left Bank top (structure within 1m)		S	B								

Structure	Left Bank-Face (structure)		S	B									
	Right Bank-Face (structure)		B	B									
	Right Bank top (structure within 1m)		S	B									
	Land-use within 5m of Right Bank top		RP	SU									
G. Channel Vegetation Types			None Submerged linear-leaved										
H. Land-use within 50m of Bank top	Left Bank		Tall herb/rank vegetation (TH) Suburban/urban development (SU)										
	Right Bank		Rough/unimproved grassland/pasture (RP) Suburban/urban development (SU)										
I. Bank Profiles	Left Bank		Re-sectioned (re-profiled) Reinforced - whole										
	Right Bank		Re-sectioned (re-profiled) Reinforced - whole										
J. Extent of Trees and Associated Features	Left Bank		Trees - none										
	Right Bank		Trees - none										
	Associated Features	Present	None										
		E (less than 33%)	None										
K. Extent of Channel and Bank Features	Present		Unbroken standing waves Smooth Flow										
	E (More than 33%)		Nil										
L. Channel Dimensions	Left Bank	Bank top height (m)											
		Is Bank top height also bankfull height?											
		Embanked height (m)											
	Channel	Bankfull width (m)											
		Water width (m)											
		Water depth (m)											
	Right Bank	Bank top height (m)											
		Is Bank top height also bankfull height?											
		Embanked height (m)											
	Bed material at site is:		Unconsolidated (loose)										
M. Features of Special Interest			None										
N. Choked Channel			No										
O. Notable Nuisance Plant Species			Japanese knotweed										

P. Overall Characteristics	Major Impacts:	Over deepening
	Other Observations:	At end of realigned/over deepened section of the River Tame SLINC, the channel passes under a rail bridge with 4 in-channel piers
Q. Alders		None

Key: BL = Broadleaf/mixed woodland, SC = Scrub, TL = Tilled land, CP = Coniferous/plantation, OR = Orchard, TH = Tall herbs, WL = Wetland, RP = Rough pasture, OW = Open water, MH = Moorland/heath, IG = Improved grassland, SU = Suburban/urban, RS = Rock & scree, NO = none, RS = re-sectioned, RI = reinforced, PC = poached, EM = embanked, SI = silt/mud, AR = artificial, UW = unbroken standing wave, RP = rippled, SM = smooth, NP = no perceptible flow, FO = ford, MB = un-vegetated mid channel bar, VB = vegetated mid channel bar

Table 31: River Habitat Survey data sheet for Section 2, River Tame SLINC

A. Field Survey Details	Ecology survey code		040-RH1-166002 - Section 2										
	Name of watercourse		River Tame SLINC										
	Surveyor(s)		FM										
	Survey start (24 hr. clock)		13:20										
	OS grid reference	Start section	SP 16073 91016										
		End section	SP 15622 90899										
	Date		11 June 2013										
	Photo reference(s)		14.1, 14.2, 14.3										
	River or Artificial Channel		River										
	Is the riverbed visible												
B. Predominant Valley Form			Asymmetrical valley										
C. Number of Riffles, Pools and Point Bars	Riffle(s)		0										
	Pool(s)		0										
	Un-vegetated point bar(s)		0										
	Vegetated point bar(s)		0										
D. Artificial Features	Channel realigned		Yes, More than 33% of site										
	Channel over-deepened		Yes, More than 33% of site										
	Water impounded by weir/dam		No										
	Other		1 Minor Bridge										
E. Physical Attributes	Left Bank	Material	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA
		Bank Modification(s)	RS EM	RS EM	RS EM	RS EM	NO	RS	RS	RS	RS	RS	RS
		Marginal and bank feature(s)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
	Channel	Channel substrate	SI	SI	NV	NV	SI	NV	NV	GP	GP	NV	NV
		Flow-type	SM	SM	SM	SM	SM	SM	SM	RP	SM	SM	SM
		Channel modification(s)	RS	RS	RS	RS	RS	RS	RS	RS	RS	RS	RS
		Channel features(s)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
	Right Bank	Material	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA
		Bank Modification(s)	RS EM	RS EM	RS EM	RS EM	RS EM	RS EM	RS EM	RS	RS	RS EM	RS EM
		Marginal and bank feature(s)	NO	NO	NO	NO	EC	NO	NO	NO	NO	NO	NO
F. Bank top Land-	Land-use within 5m of Left Bank		TH	BL	TH	TH	TH	BL	TH	TH	TH	SH	SH

use and Vegetation Structure	top										
	Left Bank top (structure within 1m)		S	C	S	S	S	C	S	S	S
	Left Bank-Face (structure)		S	S	S	S	S	S	S	S	S
	Right Bank-Face (structure)		S	S	S	S	B	S	S	S	S
	Right Bank top (structure within 1m)		S	S	S	S	S	S	C	S	S
	Land-use within 5m of Right Bank top		RP	RP	RP	RP	RP	RP	TH	SH	TH
G. Channel Vegetation Types			None Submerged linear-leaved								
H. Land-use within 50m of Bank top	Left Bank		More than 33% - Tall herb/rank vegetation (TH) Broadleaf/mixed woodland (semi-natural) (BL) Scrub and shrubs (SH)								
	Right Bank		More than 33% - Rough/unimproved grassland/pasture (RP) Scrub and shrubs (SH) Tall herb/rank vegetation (TH)								
I. Bank Profiles	Left Bank		More than 33% - Re-sectioned (re-profiled) More than 33% - Embanked Reinforced - whole								
	Right Bank		More than 33% - Re-sectioned (re-profiled) More than 33% - Embanked Reinforced - whole								
J. Extent of Trees and Associated Features	Left Bank		Trees - Isolated/scattered								
	Right Bank		Trees - Isolated/scattered								
	Associated Features	Present	Shading of channel Overhanging boughs Fallen trees								
		E (less than 33%)	None								
K. Extent of Channel and Bank Features	Present		Rippled Flow Marginal deadwater Eroding cliff(s)								
	E (More than 33%)		Smooth flow								
L. Channel Dimensions	Left Bank	Bank top height (m)	2.50								
		Is Bank top height also bankfull height?	No								
		Embanked height (m)	3.50								
	Channel	Bankfull width (m)	22.00								
		Water width (m)	15.00								
		Water depth (m)	0.50								

	Right Bank	Bank top height (m)	2.00
		Is Bank top height also bankfull height?	Yes
		Embanked height (m)	N/A
	Bed material at site is:		Unconsolidated (loose)
M. Features of Special Interest			None
N. Choked Channel			No
O. Notable Nuisance Plant Species			Japanese knotweed
P. Overall Characteristics	Major Impacts:		Over deepening
	Other Observations:		As per Section 12 and 13, this river has been realigned/straightened/over deepened historically and has embankments for most of the right bank.
Q. Alders			None

Key: BL = Broadleaf/mixed woodland, SC = Scrub, TL = Tilled land, CP = Coniferous/plantation, OR = Orchard, TH = Tall herbs, WL = Wetland, RP = Rough pasture, OW = Open water, MH = Moorland/heath, IG = Improved grassland, SU = Suburban/urban, RS = Rock & scree, NO = none, RS = re-sectioned, RI = reinforced, PC = poached, EM = embanked, SI = silt/mud, AR = artificial, UW = unbroken standing wave, RP = rippled, SM = smooth, NP = no perceptible flow, FO = ford, MB = un-vegetated mid channel bar, VB = vegetated mid channel bar

Table 32: River Habitat Survey data sheet for Section 3, River Tame SLINC

A. Field Survey Details	Ecology survey code		040-RS1-166003 - Section 3										
	Name of watercourse		River Tame SLINC										
	Surveyor(s)		FM										
	Survey start (24 hr. clock)		12:45										
	OS grid reference	Start section	SP 15576 90891										
		End section	SP 15096 90739										
	Date		11-Jun-13										
	Photo reference(s)		13.1, 13.2, 13.3										
	River or Artificial Channel		River										
	Is the riverbed visible		Partially										
B. Predominant Valley Form			Asymmetrical valley										
C. Number of Riffles, Pools and Point Bars	Riffle(s)		0										
	Pool(s)		0										
	Un-vegetated point bar(s)		0										
	Vegetated point bar(s)		0										
D. Artificial Features	Channel realigned		Yes, More than 33% of site										
	Channel over-deepened		Yes, More than 33% of site										
	water impounded by weir/dam		No										
	Other		1 Minor Outfall/Intake										
E. Physical Attributes	Left Bank	Material	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA
		Bank Modification(s)	RS	RS	RS EM	RS EM	RS EM	RS EM	RS EM	RS EM	RS EM	RS EM	RS EM
		Marginal and bank feature(s)	NO	NO	NO	NO	EC	NO	NO	NO	NO	NO	NO
	Channel	Channel substrate	NV	NV	NV	NV	GP	GP	GP	GP	NV	NV	NV
		Flow-type	SM	SM	RP	SM	UW	SM	SM	SM	SM	SM	SM
		Channel modification(s)	RS	RS	RS	RS	RS	RS	RS	RS	RS	RS	RS
		Channel features(s)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
	Right Bank	Material	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA
		Bank Modification(s)	RS EM	RS EM	RS EM	RS EM	RS EM	RS EM	RS EM	RS EM	RS EM	RS EM	RS EM
		Marginal and bank feature(s)	NO	NO	NO	NO	NO	NO	NO	EC	EC	EC	EC
F. Bank top Land-	Land-use within 5m of Left Bank		BL	BL	SU	SU	L	TH	SH	TH	TH	TH	

use and Vegetation Structure	top										
	Left Bank top (structure within 1m)		C	C	B	B	C	S	S	S	S
	Left Bank-Face (structure)		S	S	S	S	S	S	S	C	S
	Right Bank-Face (structure)		B	S	S	S	S	S	S	S	S
	Right Bank top (structure within 1m)		S	S	S	S	S	S	S	S	S
	Land-use within 5m of Right Bank top		IG	IG	IG	IG	IG	IG	IG	IG	IG
G. Channel Vegetation Types			Submerged linear-leaved								
H. Land-use within 50m of Bank top	Left Bank		More than 33% - Tall herb/rank vegetation (TH) Broadleaf/mixed woodland (semi-natural) (BL) Scrub and shrubs (SH) Suburban/urban development (SU)								
	Right Bank		More than 33% Rough/Unimproved grassland/pasture (BP)								
I. Bank Profiles	Left Bank		More than 33% - Re-sectioned (re-profiled) More than 33% - Set-back embankment More than 33% - Embanked Reinforced - toe only								
	Right Bank		More than 33% - Re-sectioned (re-profiled) More than 33% - Set-back embankment More than 33% - Embanked Reinforced - toe only								
J. Extent of Trees and Associated Features	Left Bank		Trees - Occasional clumps								
	Right Bank		Trees - Isolated/scattered								
	Associated Features	Present	Shading of channel Overhanging boughs Fallen trees								
		E (less than 33%)	None								
K. Extent of Channel and Bank Features	Present		None								
	E (More than 33%)		None								
L. Channel Dimensions	Left Bank	Bank top height (m)	2.00								
		Is Bank top height also bankfull height?	Yes								
		Embanked height (m)	3.00								
	Channel	Bankfull width (m)	27.00								
		Water width (m)	15.00								
		Water depth (m)	0.45								
	Right Bank	Bank top height (m)	N/A								

		Is Bank top height also bankfull height?	N/A
		Embanked height (m)	N/A
	Bed material at site is:		Unconsolidated (loose)
M. Features of Special Interest			None
N. Choked Channel			No
O. Notable Nuisance Plant Species			Indian balsam
P. Overall Characteristics	Major Impacts:		Over deepening
	Other Observations:		This watercourse has been previously managed. Watercourse is very straight and slow flowing, with little variety of features.
Q. Alders			None

Key: BL = Broadleaf/mixed woodland, SC = Scrub, TL = Tilled land, CP = Coniferous/plantation, OR = Orchard, TH = Tall herbs, WL = Wetland, RP = Rough pasture, OW = Open water, MH = Moorland/heath, IG = Improved grassland, SU = Suburban/urban, RS = Rock & scree, NO = none, RS = re-sectioned, RI = reinforced, PC = poached, EM = embanked, SI = silt/mud, AR = artificial, UW = unbroken standing wave, RP = rippled, SM = smooth, NP = no perceptible flow, FO = ford, MB = un-vegetated mid channel bar, VB = vegetated mid channel bar

Table 33: River Habitat Survey data sheet for Section 4, River Tame SLINC

A. Field Survey Details	Ecology survey code		040-RH1-166004 - Section 4										
	Name of watercourse		River Tame SLINC										
	Surveyor(s)		FM										
	Survey start (24 hr. clock)		12:00										
	OS grid reference	Start section	SP 15051 90722										
		End section	SP 14742 90421										
	Date		11 June 2013										
	Photo reference(s)		12.1, 12.2										
	River or Artificial Channel		River										
	Is the riverbed visible		Partially										
B. Predominant Valley Form			Asymmetrical valley										
C. Number of Riffles, Pools and Point Bars	Riffle(s)		0										
	Pool(s)		0										
	Un-vegetated point bar(s)		0										
	Vegetated point bar(s)		0										
D. Artificial Features	Channel realigned		Yes, More than 33% of site										
	Channel over-deepened		Yes, More than 33% of site										
	Water impounded by weir/dam		No										
	Other		N/A										
E. Physical Attributes	Left Bank	Material	EA	EA	EA	EA	EA	BR	BR	EA	EA	EA	
		Bank Modification(s)	RS EM	RS EM	RS EM	RS EM	RS EM	RS RI	RS RI	RS	RS	RS	
		Marginal and bank feature(s)	NO	NO	NO	NO	EC	NO	NO	NO	NO	NO	
	Channel	Channel substrate	NV	NV	GP	NV	SI	NV	NV	GP	GP	GP	
		Flow-type	SM	SM	RP	SM	SM	SM	SM	RP	SM	SM	
		Channel modification(s)	RS	RS	RS	RS	RS	RS	RS	RS	RS	RS	
		Channel features(s)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	
	Right Bank	Material	BR	BR	BR	BR	BR	EA	EA	EA	EA	EA	
		Bank Modification(s)	RI RS EM	RI RS	RI RS	RI RS EM	RI RS EM	EM RS	EM RS	EM RS	EM RS	EM RS	
		Marginal and bank feature(s)	NO	NO	NO	NO	NO	NO	NO	EC	EC	EC	

F. Bank top Land-use and Vegetation Structure	Land-use within 5m of Left Bank top		TH	TH	TH	TH	TH	SH	TH	SH	SH	SH
	Left Bank top (structure within 1m)		S	S	S	S	S	C	S	C	S	C
	Left Bank-Face (structure)		S	S	S	S	B	B	S	C	S	S
	Right Bank-Face (structure)		B	B	B	B	B	S	S	B	B	B
	Right Bank top (structure within 1m)		S	S	S	S	S	S	S	S	S	S
	Land-use within 5m of Right Bank top		IG	IG	IG	IG	IG	IG	IG	IG	IG	IG
G. Channel Vegetation Types			Submerged linear-leaved									
H. Land-use within 50m of Bank top	Left Bank		More than 33% - Scrub and shrubs (SH) More than 33% - Tall herb/rank vegetation (TH) Broadleaf/mixed woodland (semi-natural) (BL) Suburban/urban development (SU)									
	Right Bank		More than 33% - Improved/semi-improved grassland (IG) Scrub and shrubs (SH)									
I. Bank Profiles	Left Bank		More than 33% - Re-sectioned (re-profiled) More than 33% - Set-back embankment Reinforced - whole Reinforced - toe only									
	Right Bank		More than 33% - Re-sectioned (re-profiled) More than 33% - Reinforced - whole More than 33% - Set-back embankment									
J. Extent of Trees and Associated Features	Left Bank		Trees - Occasional clumps									
	Right Bank		Trees - Isolated/scattered									
	Associated Features	Present	Shading of channel Overhanging boughs									
		E (less than 33%)	Nil									
K. Extent of Channel and Bank Features	Present		Rippled flow Eroding cliff(s)									
	E (More than 33%)		Smooth flow									
L. Channel Dimensions	Left Bank	Bank top height (m)	3.00									
		Is Bank top height also bankfull height?	No									
		Embanked height (m)	N/A									
	Channel	Bankfull width (m)	26.00									
		Water width (m)	1.50									
		Water depth (m)	0.50									

	Right Bank	Bank top height (m)	2.00
		Is Bank top height also bankfull height?	Yes
		Embanked height (m)	4.00
	Bed material at site is:		Unconsolidated (loose)
M. Features of Special Interest			None
N. Choked Channel			No
O. Notable Nuisance Plant Species			Japanese knotweed Indian balsam
P. Overall Characteristics	Major Impacts:		Over deepening
	Other Observations:		Watercourse has been previously realigned and in parts reinforced. Limited number of features and flow types.
Q. Alders			None

Key: BL = Broadleaf/mixed woodland, SC = Scrub, TL = Tilled land, CP = Coniferous/plantation, OR = Orchard, TH = Tall herbs, WL = Wetland, RP = Rough pasture, OW = Open water, MH = Moorland/heath, IG = Improved grassland, SU = Suburban/urban, RS = Rock & scree, NO = none, RS = re-sectioned, RI = reinforced, PC = poached, EM = embanked, SI = silt/mud, AR = artificial, UW = unbroken standing wave, RP = rippled, SM = smooth, NP = no perceptible flow, FO = ford, MB = un-vegetated mid channel bar, VB = vegetated mid channel bar

Plants Brook within the Castle Bromwich and Bromford area (CFA25)

- 6.4.10 The width of the watercourse along this section was recorded as 3.5m. The channel has been culverted upstream and downstream of the survey location and has been artificially aligned and over-deepened, with brick and laid stone banks and an artificial channel substrate. Erosional and depositional features are absent. Japanese knotweed was recorded and there are no special features of interest. Flow type is rippled for the entire length of the section surveyed and submerged and emergent vegetation was recorded as being present.
- 6.4.11 One section of Plants Brook was surveyed using RHS. Survey results are shown Table 34.

Table 34: River Habitat Survey data sheet for Plants Brook

A. Field Survey Details	Ecology survey code		040-RH1-166005										
	Name of watercourse		Plants Brook										
	Surveyor(s)		FM										
	Survey start (24 hr. clock)		15:00										
	OS grid reference	Start section	SP 15162 90852										
		End section	SP 14883 90896										
	Date		11 June 2013										
	Photo reference(s)		16.1, 16.2										
	River or Artificial Channel		Artificial										
	Is the riverbed visible		Entirely										
B. Predominant Valley Form			No obvious valley sides										
C. Number of Riffles, Pools and Point Bars	Riffle(s)		1										
	Pool(s)		0										
	Un-vegetated point bar(s)		0										
	Vegetated point bar(s)		0										
D. Artificial Features	Channel realigned		Yes, More than 33% of site										
	Channel over-deepened		Yes, More than 33% of site										
	water impounded by weir/dam		No										
	Other		1 Major Culvert										
E. Physical Attributes	Left Bank	Material	BR	BR	BR	BR	BR	BR	BR	BR	BR	BR	
		Bank Modification(s)	RS RI	RS RI	RS RI	RS RI	RS RI	RS RI	RS RI	RS RI	RS RI	RS RI	
		Marginal and bank feature(s)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	
	Channel	Channel substrate	AR	AR	AR	AR	AR	AR	AR	AR	AR	AR	
		Flow-type	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	
		Channel modification(s)	RS RI	RS RI	RS RI	RS RI	RS RI	RS RI	RS RI	RS RI	RS RI	RS RI	
		Channel features(s)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	
	Right Bank	Material	BR	BR	BR	BR	BR	BR	BR	BR	BR	BR	
		Bank Modification(s)	RI RS	RI RS	RI RS	RI RS	RI RS	RI RS	RI RS	RI RS	RI RS	RI RS	
		Marginal and bank feature(s)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	

F. Bank top Land-use and Vegetation Structure	Land-use within 5m of Left Bank top		PG	PG	PG	TH	TH	TH	TH	SH	SH	
	Left Bank top (structure within 1m)		S	S	S	S	S	S	S	S	S	
	Left Bank-Face (structure)		B	B	B	B	B	B	B	B	B	
	Right Bank-Face (structure)		B	B	B	B	B	B	B	B	B	
	Right Bank top (structure within 1m)		S	S	S	C	S	S	S	C	S	
	Land-use within 5m of Right Bank top		PG	PG	PG	BL	TH	BL	TH	BL	TH	
G. Channel Vegetation Types			None Emergent reeds/sedges/rushes/grasses/horsetails Submerged linear-leaved									
H. Land-use within 50m of Bank top	Left Bank		Scrub and shrubs (SH) Tall herb/rank vegetation (TH) Parkland or gardens (PG)									
	Right Bank		Broadleaf/mixed woodland (semi-natural) (BL) Tall herb/rank vegetation (TH) Parkland or gardens (PG)									
I. Bank Profiles	Left Bank		More than 33% - Reinforced - toe only									
	Right Bank		More than 33% - Reinforced - toe only									
J. Extent of Trees and Associated Features	Left Bank		Trees - isolated/scattered									
	Right Bank		Trees - isolated/scattered									
	Associated Features	Present	Shading of channel									
		E (less than 33%)	None									
K. Extent of Channel and Bank Features	Present		None									
	E (More than 33%)		Smooth Flow									
L. Channel Dimensions	Left Bank	Bank top height (m)	1.50									
		Is Bank top height also bankfull height?	Yes									
		Embanked height (m)	N/A									
	Channel	Bankfull width (m)	3.50									
		Water width (m)	3.50									
		Water depth (m)	0.25									
	Right Bank	Bank top height (m)	1.50									
		Is Bank top height also bankfull height?	Yes									

		Embanked height (m)	N/A
	Bed material at site is:		
M. Features of Special Interest			None
N. Choked Channel			No
O. Notable Nuisance Plant Species			Japanese knotweed
P. Overall Characteristics	Major Impacts:		Over deepening
	Other Observations:		Culverted into River Tame SLINC at D/S end. Canalised, over deepened, realigned, artificial channel that emerges from under housing estate/playing fields
Q. Alders			None

Key: BL = Broadleaf/mixed woodland, SC = Scrub, TL = Tilled land, CP = Coniferous/plantation, OR = Orchard, TH = Tall herbs, WL = Wetland, RP = Rough pasture, OW = Open water, MH = Moorland/heath, IG = Improved grassland, SU = Suburban/urban, RS = Rock & scree, NO = none, RS = re-sectioned, RI = reinforced, PC = poached, EM = embanked, SI = silt/mud, AR = artificial, UW = unbroken standing wave, RP = rippled, SM = smooth, NP = no perceptible flow, FO = ford, MB = un-vegetated mid channel bar, VB = vegetated mid channel bar.

River Tame SLINC within the Washwood Heath to Curzon Street area(CFA26)

- 6.4.12 No direct access was possible to the channel and river features were recorded from the road bridges to the up and downstream ends of the section. The width of the watercourse in this location is approximately 15m and the channel is impacted by the two major road bridges and a major concrete deflector which passes across the channel at the downstream end. The channel has been realigned for More than 33% of the site but not over-deepened. The wider area land use is suburban, with broadleaved woodland present adjacent to the channel. No special features of interest present were recorded, though both Japanese knotweed and Indian balsam were noted as being present within the riparian zone. Flow types were varied, but channel vegetation is limited.
- 6.4.13 One section of the River Tame SLINC, immediately to the east of Washwood Heath was surveyed using RHS. Survey results are shown in Table 35.

Table 35: River Habitat Survey data sheet for River Tame SLINC

A. Field Survey Details	Ecology survey code		040-RH1-170001											
	Name of watercourse		River Tame SLINC											
	Surveyor(s)		FM											
	Survey start (24 hr. clock)		11:20											
	OS grid reference	Start section	SP 11459 89619											
		End section	SP 11611 89470											
	Date		12 June 2013											
	Photo reference(s)		17.1, 17.2											
	River or Artificial Channel		River											
	Is the riverbed visible		Partially											
B. Predominant Valley Form			Shallow vee											
C. Number of Riffles, Pools and Point Bars	Riffle(s)		1											
	Pool(s)		0											
	Un-vegetated point bar(s)		0											
	Vegetated point bar(s)		0											
D. Artificial Features	Channel realigned		Yes, less than 33% of site											
	Channel over-deepened		No											
	Water impounded by weir/dam		No											
	Other		2 Major Bridges 1 Major deflector/groyne/croy											
E. Physical Attributes	Left Bank	Material	BR	EA										
		Bank Modification(s)	RS RI	NO										
		Marginal and bank feature(s)	NO	NO										
	Channel	Channel substrate	GP	GP										
		Flow-type	RP	SM										
		Channel modification(s)	NO	RS RI										
		Channel features(s)	NO	NO										
	Right Bank	Material	GA	BR										
		Bank Modification(s)	RI RS	RI RS										
		Marginal and bank feature(s)	NO	NO										
F. Bank top Land-use	Land-use within 5m of Left Bank top		BL	SH										

and Vegetation Structure	Left Bank top (structure within 1m)		C	S										
	Left Bank-Face (structure)		S	S										
	Right Bank-Face (structure)		S	C										
	Right Bank top (structure within 1m)		C	C										
	Land-use within 5m of Right Bank top		BL	BL										
G. Channel Vegetation Types			None Submerged linear-leaved											
H. Land-use within 50m of Bank top	Left Bank		More than 33% - Broadleaf/mixed woodland (semi-natural) (BL) More than 33% - Suburban/urban development (SU) Scrub and shrubs (SH) Tall herb/rank vegetation (TH)											
	Right Bank		More than 33% - Broadleaf/mixed woodland (semi-natural) (BL) More than 33% - Suburban/urban development (SU) Scrub and shrubs (SH) Tall herb/rank vegetation (TH)											
I. Bank Profiles	Left Bank		More than 33% - Gentle Re-sectioned (re-profiled) Reinforced - toe only											
	Right Bank		More than 33% - Gentle More than 33% - Reinforced - toe only Re-sectioned - whole											
J. Extent of Trees and Associated Features	Left Bank		Trees - Semi-continuous											
	Right Bank		Trees - Semi-continuous											
	Associated Features	Present	Shading of channel											
		E (less than 33%)	None											
K. Extent of Channel and Bank Features	Present		Unbroken standing waves											
	E (More than 33%)		Rippled flow Smooth flow											
L. Channel Dimensions	Left Bank	Bank top height (m)	2.00											
		Is Bank top height also bankfull height?	Yes											
		Embanked height (m)	N/A											
	Channel	Bankfull width (m)	25.00											
		Water width (m)	15.00											
		Water depth (m)	0.60											
	Right Bank	Bank top height (m)	3.00											
		Is Bank top height also bankfull height?	No											
		Embanked height (m)	N/A											

	Bed material at site is:	Unconsolidated (loose)
M. Features of Special Interest		None
N. Choked Channel		No
O. Notable Nuisance Plant Species		Japanese knotweed
P. Overall Characteristics	Major Impacts:	Litter
	Other Observations:	Urban section of River, some hard engineering present and surrounded by urban development.
Q. Alders		None

Key: BL = Broadleaf/mixed woodland, SC = Scrub, TL = Tilled land, CP = Coniferous/plantation, OR = Orchard, TH = Tall herbs, WL = Wetland, RP = Rough pasture, OW = Open water, MH = Moorland/heath, IG = Improved grassland, SU = Suburban/urban, RS = Rock & scree, NO = none, RS = re-sectioned, RI = reinforced, PC = poached, EM = embanked, SI = silt/mud, AR = artificial, UW = unbroken standing wave, RP = rippled, SM = smooth, NP = no perceptible flow, FO = ford, MB = un-vegetated mid channel bar, VB = vegetated mid channel bar.

River Rea within the Washwood Heath to Curzon Street area (CFA26)

- 6.4.14 No direct access was possible to the channel, and no river features were recorded from the road bridges to the up and downstream ends of the sections. The width of the watercourse in this location is approximately 5m and it is contained within an entirely artificial channel with brick and laid stone banks, and an artificial channel substrate. Four bridges cross the channel. Three of these are intermediate in size whilst the forth is major. The channel has been realigned and over-deepened along the entire lengths of the sections surveyed. Japanese knotweed and giant hogweed were recorded as being present and no special features of interest were noted. There is limited variation in flow type, which is primarily rippled, and no channel vegetation is present.
- 6.4.15 Two sections of the River Rea were surveyed using RHS. The survey results are shown in Table 36 and Table 37.

Table 36: River Habitat Survey data sheet for Section 1, River Rea

A. Field Survey Details	Ecology survey code		040-RH1-173001 - Section 1										
	Name of watercourse		River Rea										
	Surveyor(s)		FM										
	Survey start (24 hr. clock)		10:30										
	OS grid reference	Start section	SP 09233 88302										
		End section	SP 09107 87802										
	Date		13 June 2013										
	Photo reference(s)		18.1 18.2										
	River or Artificial Channel		River										
	Is the riverbed visible		Partially										
B. Predominant Valley Form			Shallow vee										
C. Number of Riffles, Pools and Point Bars	Riffle(s)		0										
	Pool(s)		0										
	Un-vegetated point bar(s)		0										
	Vegetated point bar(s)		0										
D. Artificial Features	Channel realigned		No										
	Channel over-deepened		Yes, More than 33% of site										
	water impounded by weir/dam		No										
	Other		2 Intermediate Bridges within 500m										
E. Physical Attributes	Left Bank	Material	BR	BR	BR	BR	BR	BR	BR	BR	BR	BR	BR
		Bank Modification(s)	RS RI	RS RI	RS RI	RS RI	RS RI	RS RI	RS RI	RS RI	RS RI	RS RI	RS RI
		Marginal and bank feature(s)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
	Channel	Channel substrate	AR	AR	AR	AR	AR	AR	AR	AR	AR	AR	AR
		Flow-type	RP	RP	RP	RP	RP	RP	RP	RP	RP	RP	RP
		Channel modification(s)	RS RI	RS RI	RS RI	RS RI	RS RI	RS RI	RS RI	RS RI	RS RI	RS RI	RS RI
		Channel features(s)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
	Right Bank	Material	BR	BR	BR	BR	BR	BR	BR	BR	BR	BR	BR
		Bank Modification(s)	RS RI	RS RI	RS RI	RS RI	RS RI	RS RI	RS RI	RS RI	RS RI	RS RI	RS RI
		Marginal and bank feature(s)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
F. Bank top Land-	Land-use within 5m of Left Bank		SU	SU	SU	SU	SU	SU	SU	SU	SU	SU	SU

use and Vegetation Structure	top										
	Left Bank top (structure within 1m)		S	S	S	S	S	S	S	S	S
	Left Bank-Face (structure)		B	B	B	B	B	B	B	B	B
	Right Bank-Face (structure)		B	B	B	B	B	B	B	B	B
	Right Bank top (structure within 1m)		S	S	S	S	S	S	S	S	S
	Land-use within 5m of Right Bank top		SU	SU	SU	SU	SU	SU	SU	SU	SU
G. Channel Vegetation Types			None								
H. Land-use within 50m of Bank top	Left Bank		More than 33% - Broadleaf/mixed woodland (semi-natural) (BL) E Scrub and shrubs (SH)								
	Right Bank		More than 33% - Broadleaf/mixed woodland (semi-natural) (BL) E Scrub and shrubs (SH)								
I. Bank Profiles	Left Bank		More than 33% - Reinforced - whole								
	Right Bank		More than 33% - Reinforced - whole								
J. Extent of Trees and Associated Features	Left Bank		Trees - Occasional clumps Associated Features - None								
	Right Bank		Trees - Occasional clumps Associated Features - None								
K. Extent of Channel and Bank Features	Present		Smooth Flow								
	E (More than 33%)		Rippled flow								
L. Channel Dimensions	Left Bank	Bank top height (m)	4.00								
		Is Bank top height also bankfull height?	Yes								
		Embanked height (m)	N/A								
	Channel	Bankfull width (m)	15.00								
		Water width (m)	5.00								
		Water depth (m)	0.30								
	Right Bank	Bank top height (m)	4.00								
		Is Bank top height also bankfull height?	Yes								
		Embanked height (m)	N/a								
M. Features of Special Interest			None								
N. Choked Channel			No								

O. Notable Nuisance Plant Species		Japanese knotweed
P. Overall Characteristics	Major Impacts:	Over deepening
	Other Observations:	Natural course of River in entirely artificial channel, 100% of channel is brick. No natural features at all
Q. Alders		Present

Key: BL = Broadleaf/mixed woodland, SC = Scrub, TL = Tilled land, CP = Coniferous/plantation, OR = Orchard, TH = Tall herbs, WL = Wetland, RP = Rough pasture, OW = Open water, MH = Moorland/heath, IG = Improved grassland, SU = Suburban/urban, RS = Rock & scree, NO = none, RS = re-sectioned, RI = reinforced, PC = poached, EM = embanked, SI = silt/mud, AR = artificial, UW = unbroken standing wave, RP = rippled, SM = smooth, NP = no perceptible flow, FO = ford, MB = un-vegetated mid channel bar, VB = vegetated mid channel bar

Table 37: River Habitat Survey data sheet for Section 2, River Rea

A. Field Survey Details	Ecology survey code		040-RH1-174001 - Section 2										
	Name of watercourse		River Rea										
	Surveyor(s)		FM										
	Survey start (24 hr. clock)		11:40										
	OS grid reference	Start section	SP 09107 87802										
		End section	SP 08757 87386										
	Date		10 June 2013										
	Photo reference(s)		19.1, 19.2										
	River or Artificial Channel		River										
Is the riverbed visible		Partially											
B. Predominant Valley Form			Shallow vee										
C. Number of Riffles, Pools and Point Bars	Riffle(s)		0										
	Pool(s)		0										
	Un-vegetated point bar(s)		0										
	Vegetated point bar(s)		0										
D. Artificial Features	Channel realigned		Yes, More than 33% of site										
	Channel over-deepened		Yes, More than 33% of site										
	Water impounded by weir/dam		No										
	Other		Bridge										
E. Physical Attributes	Left Bank	Material	BR	BR	BR	BR	BR	BR	BR	BR	BR	BR	BR
		Bank Modification(s)	RS RI	RS RI	RS RI	RS RI	RS RI	RS RI	RS RI	RS RI	RS RI	RS RI	RS RI
		Marginal and bank feature(s)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
	Channel	Channel substrate	AR	AR	AR	AR	AR	AR	AR	AR	AR	AR	AR
		Flow-type	RP	RP	RP	RP	RP	RP	RP	RP	RP	RP	RP
		Channel modification(s)	RS RI	RS RI	RS RI	RS RI	RS RI	RS RI	RS RI	RS RI	RS RI	RS RI	RS RI
		Channel features(s)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
	Right Bank	Material	BR	BR	BR	BR	BR	BR	BR	BR	BR	BR	BR
		Bank Modification(s)	RS RI	RS RI	RS RI	RS RI	RS RI	RS RI	RS RI	RS RI	RS RI	RS RI	RS RI
		Marginal and bank feature(s)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
F. Bank top Land-use and Vegetation	Land-use within 5m of Left Bank top		SU	SU	SU	SU	SU	SU	SU	SU	SU	SU	

Structure	Left Bank top (structure within 1m)		B	B	B	B	B	B	B	B	B	B
	Left Bank-Face (structure)		B	B	B	B	B	B	B	B	B	B
	Right Bank-Face (structure)		B	B	B	B	B	B	B	B	B	B
	Right Bank top (structure within 1m)		S	S	S	S	S	S	S	S	S	S
	Land-use within 5m of Right Bank top		SU	SU	SU	SU	SU	SU	SU	SU	SU	SU
G. Channel Vegetation Types			None									
H. Land-use within 50m of Bank top	Left Bank		More than 33% - Suburban/urban development (SU) Broadleaf/mixed woodland (semi-natural) (BL) Scrub and shrubs (SH) Tall herb/rank vegetation (TH)									
	Right Bank		More than 33% - Suburban/urban development (SU) Broadleaf/mixed woodland (semi-natural) (BL) Scrub and shrubs (SH) Tall herb/rank vegetation (TH)									
I. Bank Profiles	Left Bank		More than 33% - Reinforced - whole									
	Right Bank		More than 33% - Reinforced - whole									
J. Extent of Trees and Associated Features	Left Bank		Trees - Semi-continuous									
	Right Bank		Trees - Occasional clumps									
K. Extent of Channel and Bank Features	Present		Smooth Flow									
	E (More than 33%)		Rippled flow									
L. Channel Dimensions	Left Bank	Bank top height (m)	4.00									
		Is Bank top height also bankfull height?	Yes									
		Embanked height (m)	N/A									
	Channel	Bankfull width (m)	15.00									
		Water width (m)	5.00									
		Water depth (m)	0.30									
	Right Bank	Bank top height (m)	4.00									
		Is Bank top height also bankfull height?	Yes									
		Embanked height (m)	N/A									
M. Features of Special Interest			None									

N. Choked Channel		No
O. Notable Nuisance Plant Species		Giant hogweed Japanese knotweed
P. Overall Characteristics	Major Impacts:	Over deepening
	Other Observations:	Natural course of River Rea but in an entirely artificial channel, no natural features within 500m.
Q. Alders		None

Key: BL = Broadleaf/mixed woodland, SC = Scrub, TL = Tilled land, CP = Coniferous/plantation, OR = Orchard, TH = Tall herbs, WL = Wetland, RP = Rough pasture, OW = Open water, MH = Moorland/heath, IG = Improved grassland, SU = Suburban/urban, RS = Rock & scree, NO = none, RS = re-sectioned, RI = reinforced, PC = poached, EM = embanked, SI = silt/mud, AR = artificial, UW = unbroken standing wave, RP = rippled, SM = smooth, NP = no perceptible flow, FO = ford, MB = un-vegetated mid channel bar, VB = vegetated mid channel bar

7 River corridor survey

7.1 Introduction

7.1.1 This section of the appendix presents details of the river corridor survey (RCS) data for the section of the Proposed Scheme that will pass through CFA23, CFA24, CFA25 and CFA26.¹²³

7.2 Methodology

7.2.1 Details of the standard methodology for RCS are provided in Ecology technical note: Ecological field survey methods and standards (Volume 5: Appendix CT-001-000/2).

7.2.2 A summary of locations at which RCS was undertaken, is provided in Table 38.

Table 38: Summary of locations where RCS was undertaken in CFA23, CFA24, CFA25 and CFA26

Ecology survey code	Watercourse name	Feature type	Survey date(s)	CFA	Distance from land required for the construction of the Proposed Scheme ¹²⁴ (m) and orientation
040-RS1-148001	Bayleys Brook	Small slow flowing channel of stream	14 August 2012	23	Within land required
040-RS1-149001	Bayleys Brook	Silted/muddy bottomed slow flowing part of stream	06 June 2013	23	Within land required
040-RS1-149002	Bayleys Brook	Meandering stream	06 June 2013	23	Within land required
040-RS1-153001	River Blythe SSSI	Wide, up to 1.5m deep part of river	05 September 2012	23	Within land required
040-RS1-154001	River Blythe SSSI	Relatively wide, 1.2m deep section of river	05 September 2012	23	Within land required
040-RS1-155001	Shadow Brook	Silt bottomed stream	06 September 2012	23	Within land required
040-RS1-155002	Shadow Brook	Silt bottomed stream	06 September 2012	23	Within land required
040-RS1-155003	River Blythe SSSI	Relatively wide, 1.2m deep channel	05 September 2012	24	Within land required
040-RS1-156001	Hollywell Brook	Small, moderately flowing stream; gently meandering and narrow channel	07 September 2012; 10 June 2013	24	Within land required
040-RS1-156002	Hollywell Brook	Small, moderately flowing stream; narrow meandering channel	07 September 2012; 10 June 2013	24	Within land required
040-RS1-156003	Hollywell Brook	Small, moderately flowing stream; realigned and deepened	10 June 2013	24	Within land required

¹²³ River corridor survey was a method used to provide basic ecological information about a stretch of river and its accompanying bank. It involved the production of standardised maps of vegetation structure and channel morphology for 500m sections of river.

¹²⁴ The phrase 'Within land required' represents an abbreviation of this term

Ecology survey code	Watercourse name	Feature type	Survey date(s)	CFA	Distance from land required for the construction of the Proposed Scheme ¹²⁴ (m) and orientation
		channel			
040-RS1-166001	River Tame SLINC	Large, realigned watercourse; 10-15m wide channel narrowing to 7m under railway bridge	26 July 2012	25	Within land required
040-RS1-166002	River Tame SLINC	Large, realigned watercourse; 8-9m wide channel	26 July 2012	25	Within land required
040-RS1-166003	River Tame SLINC	Large, realigned watercourse; open channel with gravel base	26 July 2012	25	Within land required
040-RS1-166004	River Tame SLINC	Large, realigned watercourse; wide, fast flowing area of channel	12 July 2012	25	100m south
040-RS1-166005	Plants Brook	Small, realigned and deepened watercourse; realigned and deepened channel	12 June 2013	25	Within land required
040-RS1-170001	River Tame SLINC	Large, realigned watercourse; Realigned with stone/concrete banks	12 June 2013	26	Within land required
040-RS1-173001	River Rea	Moderate sized, heavily realigned watercourse	13 June 2013	26	Within land required
040-RS1-173002	River Rea	Moderate sized, heavily realigned watercourse	13 June 2013	26	Within land required

7.3 Deviations, constraints and limitations

7.3.1 Access was not available to two locations identified for RCS as stated in Table 39.

Table 39: Summary of locations where requirement for RCS identified but no access available for survey

Watercourse	Location	OS grid reference start and finish	Description of proposed survey location	CFA	Distance from land required for the construction of the Proposed Scheme ¹²⁵
Bayleys Brook	Adjacent to Marsh Lane Nature Reserve	SP 21745 80286 to SP 23055 79678	Stream No land access	23	Within land required.
River Tame SLINC	Urban areas of the River Tame SLINC	SP 11616 89470 to SP 10708 89572	Most sections were either inaccessible, or access was not granted. Given the urban nature of the catchment, the sections not surveyed are considered likely to be similar to those described in the Castle Bromwich and Bromford area (CFA25), and are known to have been re-aligned with stone/concrete	26	Within land required

¹²⁵ The phrase 'Within land required' represents an abbreviation of this term

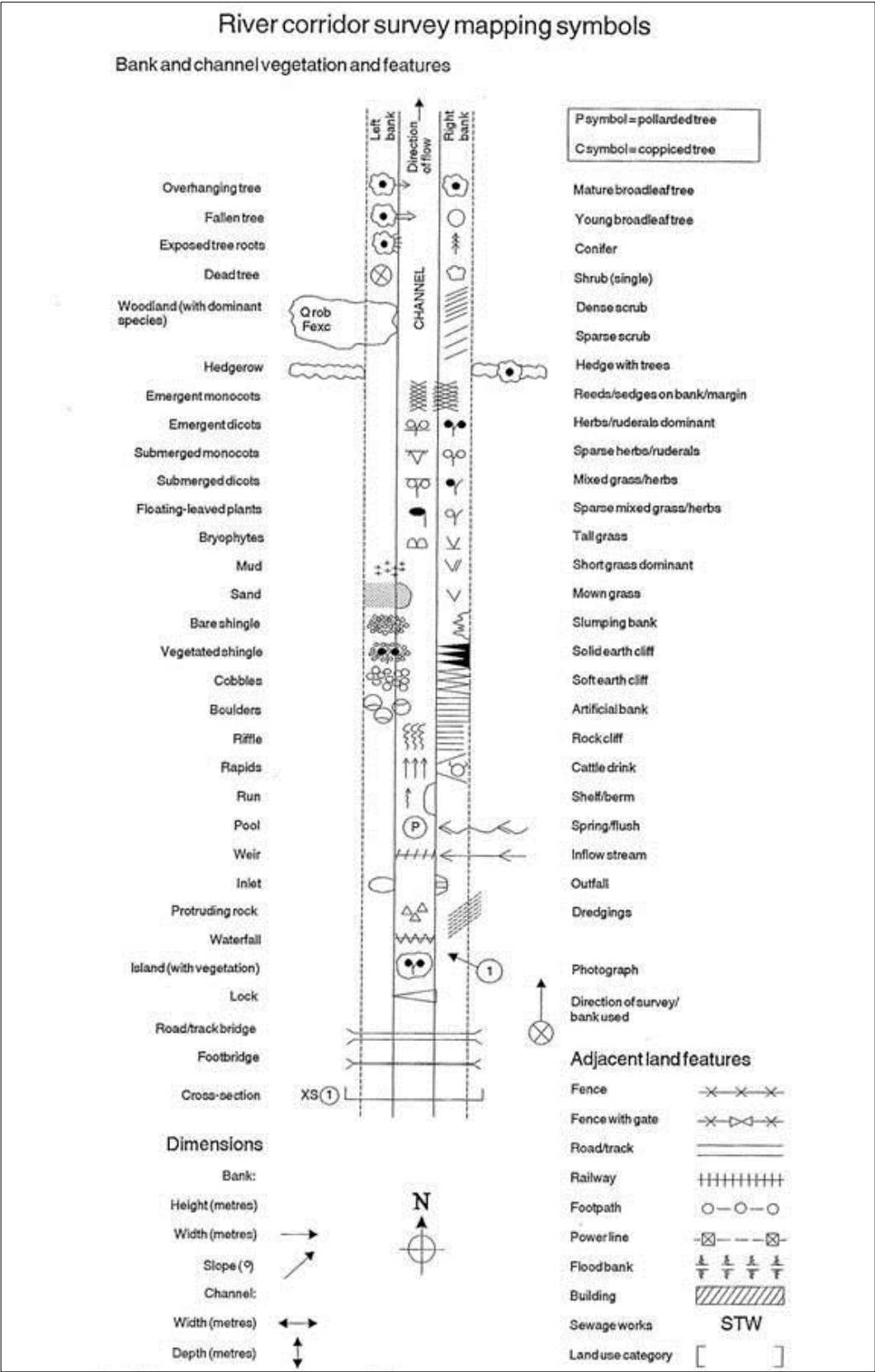
Watercourse	Location	OS grid reference start and finish	Description of proposed survey location	CFA	Distance from land required for the construction of the Proposed Scheme ¹²⁵
			banks.		

7.4 Baseline

- 7.4.1 The key shown in Figure 1 can be used to interpret the hand drawn maps of river sections shown in Figure 2 to Figure 54¹²⁶.

¹²⁶ National Rivers Authority (1992). River Corridor Surveys. Conservation Technical Handbook Number 1.

Figure 1: River Corridor Survey Mapping Symbols



Bayleys Brook within the Balsall Common and Hampton-in-Arden area (CFA23)

- 7.4.2 Bayleys Brook is a small stream with earth banks, and a general low to moderate diversity of habitats with some areas that had historically been straightened. It was mostly slow-flowing with a fine sediment base (silt and sand), although some riffles with gravel substrate were also recorded. It was heavily shaded and appeared to be of limited importance to fish, macrophytes and invertebrates in most areas surveyed.
- 7.4.3 Three different sections of Bayleys Brook were surveyed using RCS in the Balsall Common and Hampton-in-Arden area (CFA23). The findings of these surveys are shown in Table 40, Table 41 and Table 42. The hand drawn figures are shown in Figure 2, Figure 3, Figure 7 and Figure 10. Photographs of the sections of river can be found in Figure 4, Figure 5, Figure 6, Figure 8, Figure 9 and Figure 11.

Table 40: RCS results for Bayleys Brook - Section 1 (CFA23)

Ecology survey code	040-RS1-148001 - Section 1		
Name of watercourse	Bayleys Brook		
Surveyor(s)	GE, NG	Date	14 August 2012
Survey start	11:40	Survey finish	12:40
Weather conditions	Warm, dry, no preceding rainfall		
OS grid reference	Start section	SP 2492 7722	
	End section	SP 2455 7763	
Photo reference(s)	040-RS1-148001-P-140812-P1, 040-RS1-148001-P-140812-P2, 040-RS1-148001-P-140812-P3		
Average width (m)	1.00		
Average depth (m)	0.10 - 0.20		
Brief description of channel	Small, slow-flowing muddy (silt based) channel, highly vegetated in sections upstream of disused rail line. Downstream of rail line, channel heavily shaded and generally faster flowing, more variable with occasional riffles, exposed tree root habitats and larger stony substrate. Wetter area: 1m wide, 0.1m deep.		
Base substrate	Silt, occasional gravel.		
Bank type (include height, angle and extent of erosion)	left bank	Earth, shallow and vegetated with little slope, except near to rail line embankment, where banks are engineered, approx. 3m high and 70° steep.	
	right Bank	Hedge lined and mostly vegetated, shallow (less than 0.5m), earth banks with a moderate slope (20 to 30°).	
Notable channel features	left bank	Fallen trees, wood dams, vegetation, riffles and glides downstream of rail line.	
	right bank	As left bank.	
Marginal vegetation (description)	left bank	Highly vegetated with reed canary-grass, fool's water-cress, brooklime, water forget-me-not, water mint and water-cress (<i>Rorripa nasturtium-aquaticum</i>) upstream of rail line. Very little vegetation in shaded section downstream of rail line.	
	right bank	As left bank.	
Bank zone habitats (description)	left bank	Grass, scrub, riparian woodland (broadleaf) and embankment (railway).	
	right bank	Hedge, riparian woodland (broadleaf and coniferous), scrub and areas of exposed earth (erosion).	
Adjacent land use	left bank	Grazed and un-grazed pasture, roads, rail station and car park.	
	right bank	Grazed and un-grazed pasture, roads, rail station and car park, arable, broadleaf and coniferous woodland.	
Fauna of interest	None recorded.		
Recreation features	Public footpath in area.		
Existing management	Parts of channel appear to have been historically altered, but no evidence of recent management.		
Observed or potential	Pollution from road and railway runoff, erosion of banks leading to sediment deposits on substrate.		

threats to conservation value	
Suggestions for habitat improvement	Measures to reduce erosion, realignment and modification of channel to incorporate natural course.

Figure 2: RCS hand drawn map for Bayleys Brook - Section 1 (040-RS1-148001)

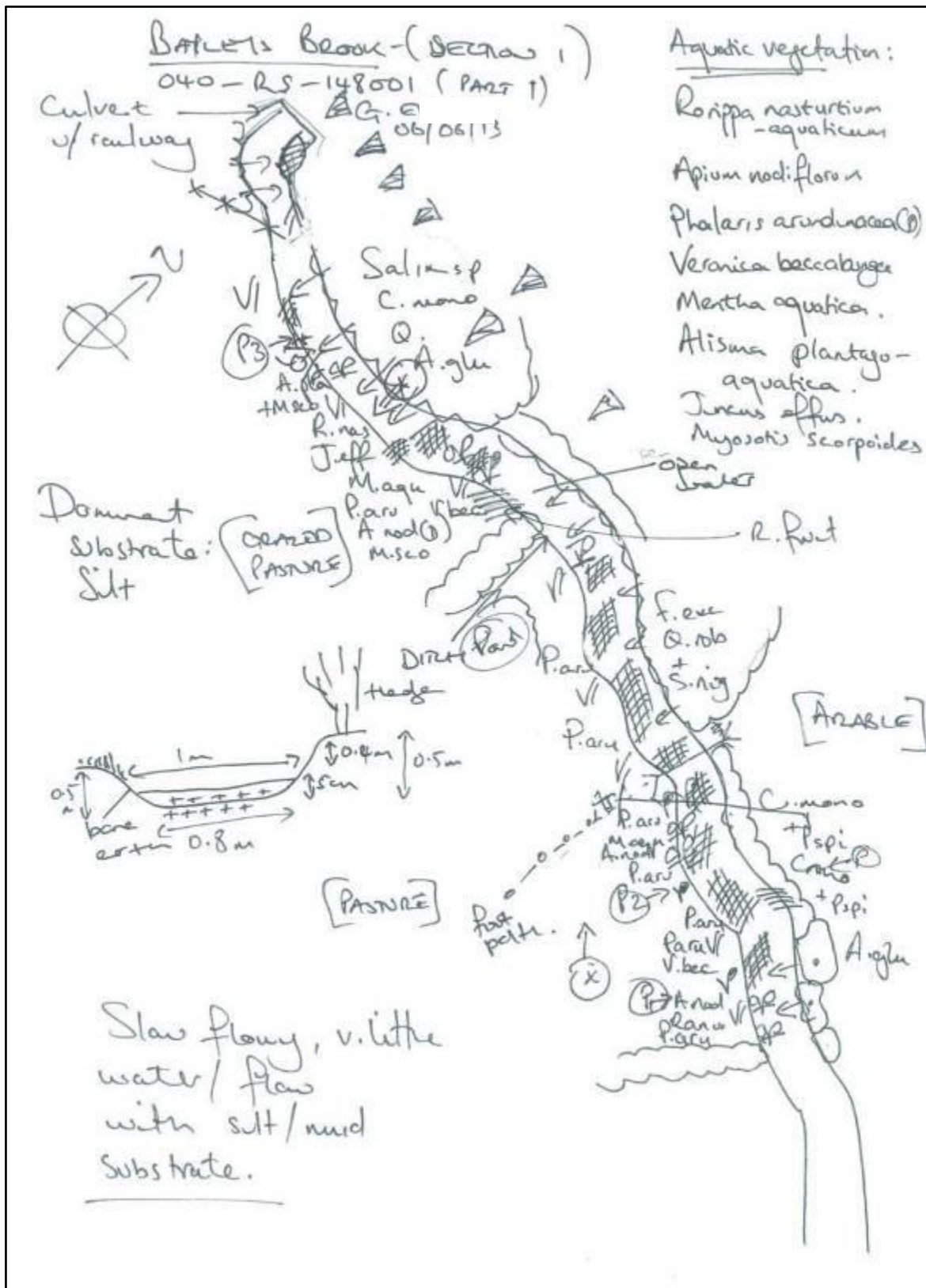


Figure 3: RCS hand drawn map for Bayleys Brook - Section 1 (040-RS1-148001)

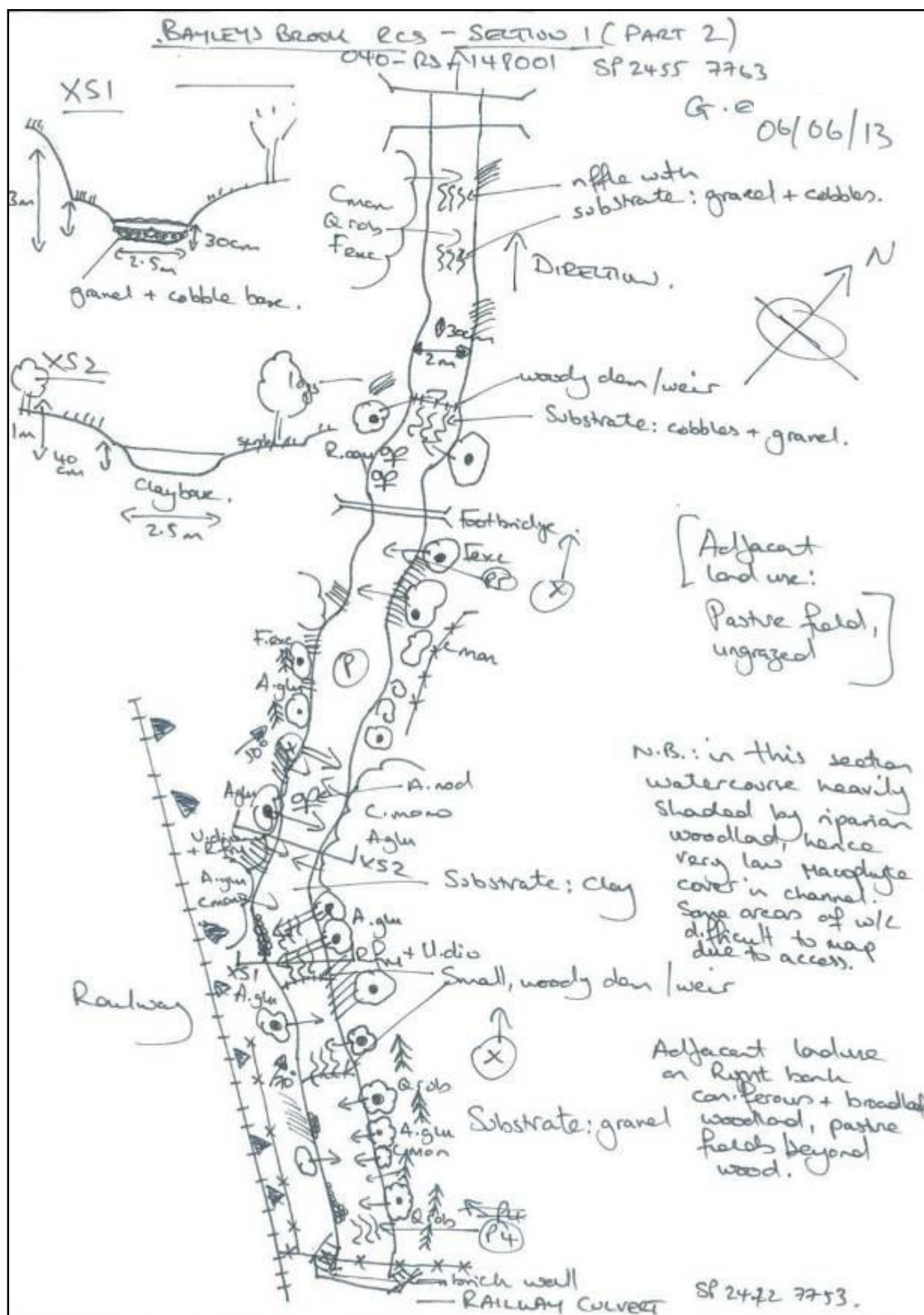


Figure 4: Photograph of Bayleys Brook - Section 1 (CFA23), photo reference 040-RS1-148001-P-140812-P1



Figure 5: Photograph of Bayleys Brook - Section 1 (CFA23), photo reference 040-RS1-148001-P-140812-P2



Figure 6: Photograph of Bayleys Brook - Section 1 (CFA23), photo reference 040-RS1-148001-P-140812-P3



Table 41: RCS results for Bayleys Brook - Section 2 (CFA23)

Ecology survey code	040-RS1-149001		
Name of watercourse	Bayleys Brook		
Surveyor(s)	GE, NG	Date	13 September 2012; 06 June 2013
Survey start	12:40	Survey finish	13:50
Weather conditions	Warm, dry, overcast with no preceding rainfall		
OS Grid Ref (8 digit)	Start Section	SP 2454 7763	
	End Section	SP 2428 7816	
Photo Ref(s)	040-RS1-149001-P1-13/09/12-P1, 040-RS1-149001-P1-13/09/12-P2		
Average width (m)	1.00		
Average depth (m)	0.10		
Brief description of channel	Silted/muddy bottomed slow flowing watercourse, with occasional gravel, tree roots, woody dams and riffles. Channel heavily shaded in some areas. In upstream sections (approx. 200m), channel is mostly straight and deep, following field boundaries. Historically it is likely to have been diverted. Downstream sections much more meandering and natural.		
Base substrate	Silt, occasional gravel and sand.		
Bank type (include height, angle and extent of erosion)	left bank	Earth banks, vegetated, varying height (1 – 1.5m) and slope (40° to 80°), signs of erosion. Generally higher, steeper and less accessible banks in section through fisheries land (upstream approx. 300m).	
	right bank	Earth banks, vegetated, varying height (0.5 - 0.8m) and slope (50° to 80°), eroded. Generally higher, steeper and less accessible banks in section through fisheries land (upstream approximately 300m).	
Notable channel features	left bank	See right bank.	
	right bank	Occasional roots and wood dams/weirs.	
Marginal vegetation (description)	left bank	Generally heavily shaded by surrounding trees and scrub, therefore vegetation is sparse. Where not shaded, fool's water-cress, watercress and water mint were the dominant species, but water starwort and reed canary-grass also recorded.	
	right bank	See left bank.	
Bank zone habitats (description)	left bank	Scrub, rough grass/herbs and mixed grasses/herbs.	
	right bank	Woodland, grazed pasture, hedgerow and dense scrub.	
Adjacent land use	left bank	Grazed pasture fields, semi-improved grassland, roads, some arable and fishing club (ponds) in adjacent land.	
	right bank	Grazed pasture and arable.	
Fauna of interest	None observed.		
Recreation features	Adjacent fishery.		
Existing management	No evidence of recent management.		
Observed or potential threats to conservation value	Arable and road runoff and discharge from fishery ponds (outfalls not identified).		

Suggestions for habitat improvement	Measures to reduce shading from shrubs and trees and to control erosion of banks.
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Figure 7: RCS hand drawn map for Bayleys Brook - Section 2 (040-RS1-149001)

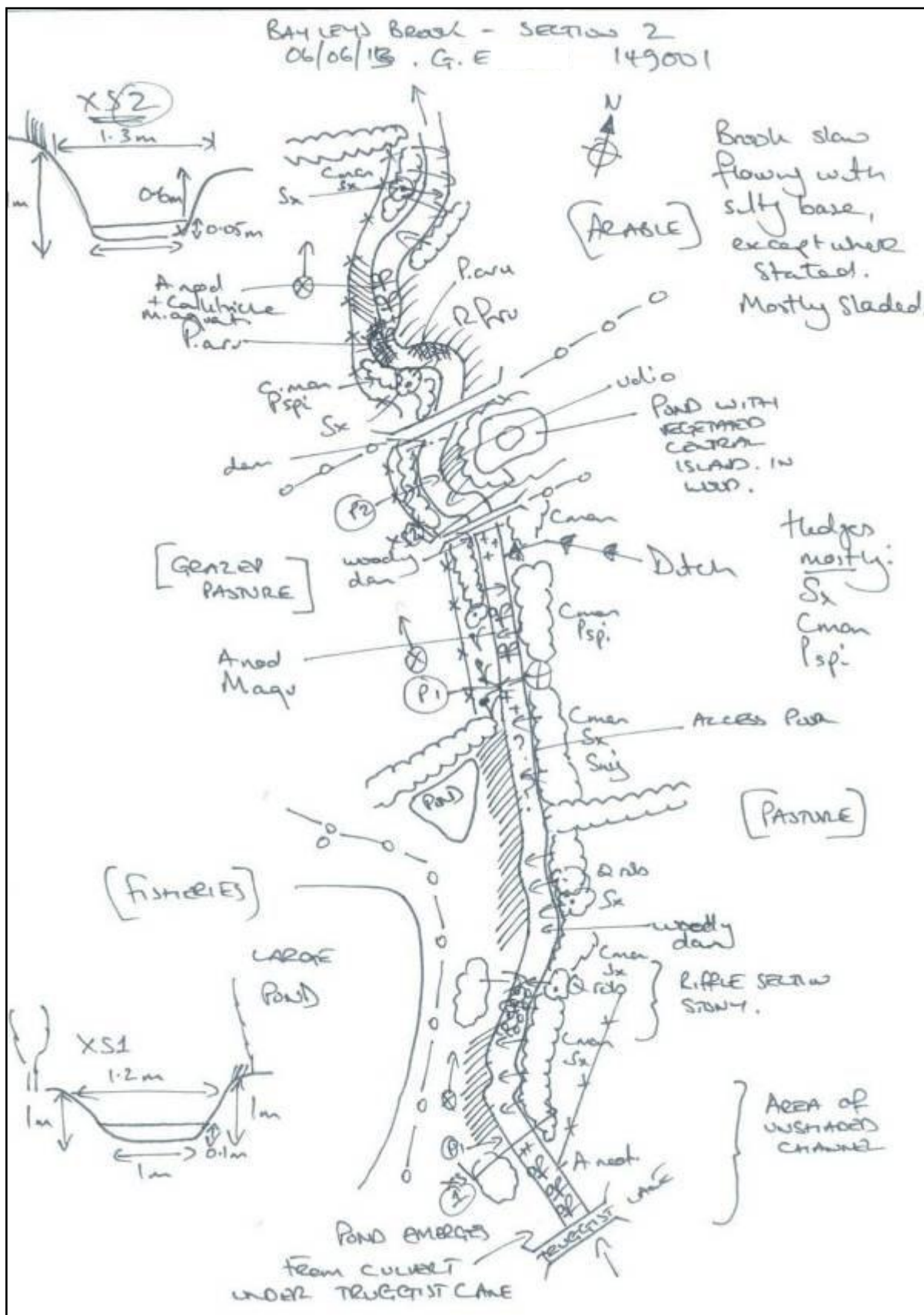


Figure 8: Photograph of Bayleys Brook - Section 2 (CFA23), photo reference 040-RS1-149001-P1-13/09/12-P1



Figure 9: Photograph of Bayleys Brook - Section 2 (CFA23), photo reference 040-RS1-149001-P1-13/09/12-P2



Table 42 RCS results for Bayleys Brook - Section 3 (CFA23)

Ecology survey code	040-RS-149002		
Name of watercourse	Bayleys Brook		
Surveyor(s)	GE	Date	05 June 2013
Survey start	13:45	Survey finish	14:25
Weather conditions	Fine, no preceding rain		
OS Grid Ref (8 digit)	Start Section	SP 2429 7816	
	End Section	SP 2147 7836	
Photo Ref(s)	040-RS1-149002-P-050613-P1		
Average width (m)	1.00		
Average depth (m)	0.20		
Brief description of channel	Meandering stream, generally heavily shaded. Slow flowing (sand and silt base) and fast flowing riffles (gravel, pebbles and some cobbles) in other sections. No obvious evidence of existing management.		
Base substrate	Sand and silt dominant, with gravel and pebbles in riffles.		
Bank type (include height, angle and extent of erosion)	left bank	Low (0.8m high), steep (approx. 45°) earth banks and vegetated. Occasional trees, hedgerows, scrub, mostly heavily vegetated, with trees, herbs/ruderal herbs and mixed grasses habitats.	
	right bank	As left bank.	
Notable channel features	left bank	As right bank.	
	right bank	Occasional riffles.	
Marginal vegetation (description)	left bank	See right bank.	
	right bank	Generally heavily shaded, therefore vegetation is sparse. Where not shaded fool's water-cress and willowherb (<i>Epilobium</i> sp.) are present.	
Bank zone habitats (description)	left bank	Scrub, hedgerow, trees/shrubs, herbs/ruderal herbs and mixed grasses.	
	right bank	As left bank	
Adjacent land use	left bank	Mostly arable and grazed pasture fields and roads.	
	right bank	As left bank.	
Fauna of interest	None recorded.		
Recreation features	None recorded.		
Existing management	No evidence of existing or recent management.		
Observed or potential threats to conservation value	Runoff from agriculture and roads.		
Suggestions for habitat improvement	None.		

Figure 10: RCS hand drawn map for Bayleys Brook - Section 3 (040-RS-149002)

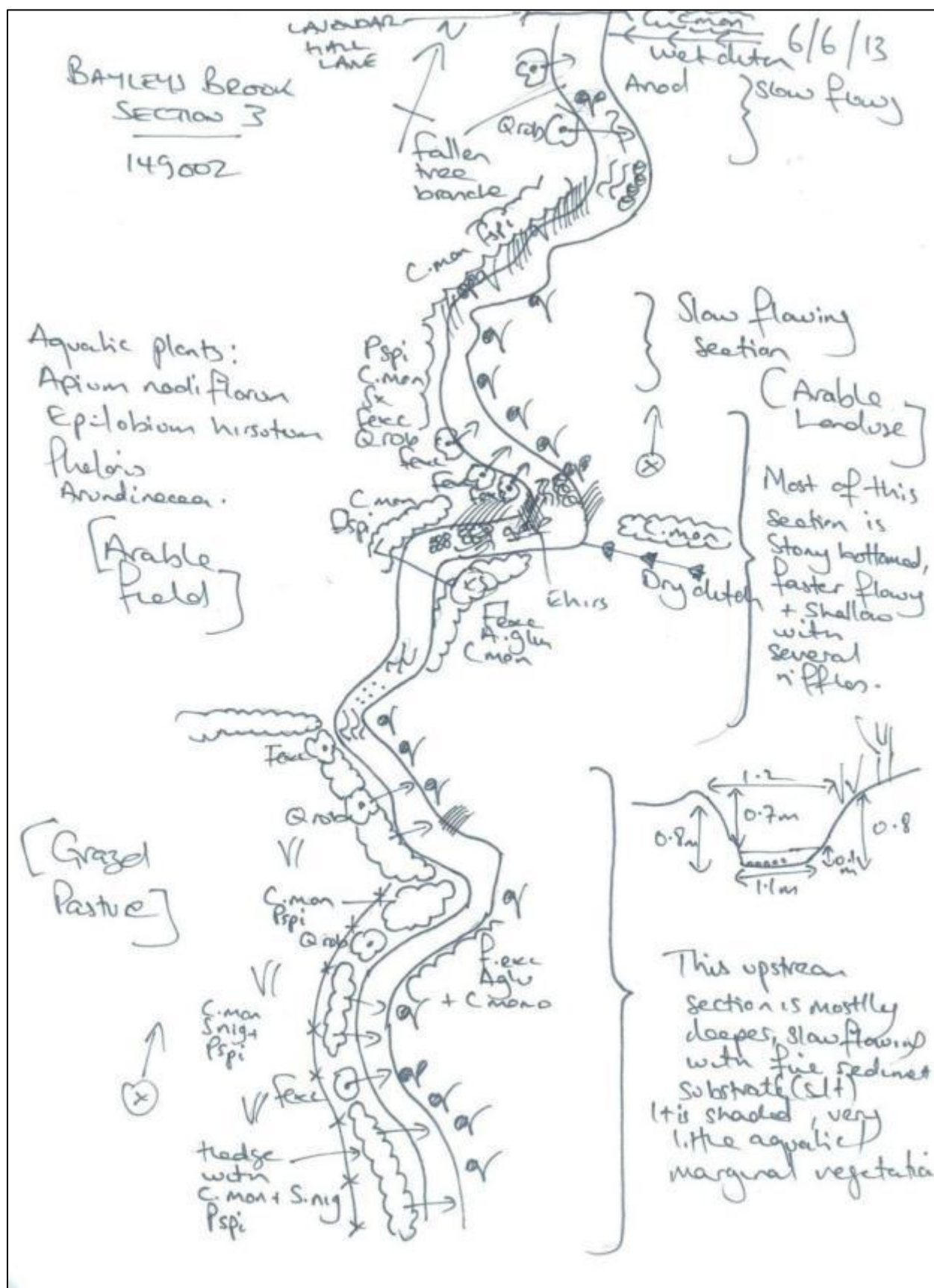


Figure 11: Photograph of Bayleys Brook - Section 3 (CFA23), photo reference 040-RS1-149002-P-050613-P1



River Blythe SSSI within the Balsall Common and Hampton-in-Arden area (CFA23)

- 7.4.4 The River Blythe SSSI is a moderate sized river, with a relatively natural course and a wide variation of habitat types (riffles, pools, glides, shaded and open areas). It is characterised by sometimes dense and relatively diverse marginal and submerged plants. None of the species recorded were uncommon, although it has been designated as an SSSI in part due to rare and scarce aquatic flora. The RCS survey of the River Blythe SSSI was split into three separate 500m RCS sections, two of which were within the Balsall Common and Hampton-in-Arden area (CFA23). Findings of these surveys are shown in Table 43 and Table 44 and hand drawn figures are shown in Figure 12 and Figure 14. Photographs of the sections of river can be found in Figure 13 and Figure 15.

Table 43: RCS results for River Blythe SSSI - Section 1 (CFA23)

Ecology survey code	040-RS1-153001		
Name of watercourse	River Blythe SSSI		
Surveyor(s)	GE	Date	05 September 2012
Survey start	13:20	Survey finish	15:00
Weather conditions (description)	Dry, warm and no preceding rain		
OS Grid Ref (8 digit)	Start Section	SP 2156 8108	
	End Section	SP 2138 8149	
Photo Ref(s)	040-RS1-153001-P-050912		
Average width (m)	6.00-7.00		
Average depth (m)	1.50		
Brief description of channel	Relatively wide (approx. 6/7m), up to 1.5m deep (shallower in many areas), meandering watercourse, with fast flowing section, riffles, runs and glides upstream of Meriden Road. Included a large road crossing. Substrate comprises gravel, cobbles and pebbles, silt and sand. Channel habitats also include vegetated islands, exposed shingle and pools.		
Base substrate	Gravel, cobbles, pebbles, silt and sand.		
Bank type (include height, angle and extent of erosion)	left bank	Banks natural and vegetated, relatively shallow. Approx. 0.6m high and 30°–70° angle. Clear evidence of erosion at cattle feed areas.	
	right bank	As left bank.	
Notable channel features	left bank	Vegetated islands/berms and riffles.	
	right bank	As left bank.	
Marginal vegetation (description)	left bank	As right bank.	
	right bank	Marginal areas highly vegetated, including iris (<i>Iris pseudacorus</i>), soft rush (<i>Juncus effusus</i>), willowherb, water forget-me-not, sedge sp. (<i>Carex</i> sp.), branched bur-reed (<i>Sparganium erectum</i>) and fool's water-cress. Buttercup species (<i>Ranunculus</i> sp.) and water starwort were also present in the channel.	
Bank zone habitats (description)	left bank	Broadleaved trees, reeds, scrub and exposed sand/shingles.	
	right bank	As left bank.	
Adjacent land use)	left bank	Grazed pasture, meadow, broadleaf trees and roads/tracks.	
	right bank	As right bank.	
Fauna of interest	None recorded.		
Recreation features	None recorded.		
Existing management	Grazed farmland, no evidence of management of channel.		
Observed or potential threats to conservation value	Run-off from road and farmland, erosion of banks and cattle trampling/drinking areas.		

Suggestions for habitat improvement	Protection from cattle trampling/erosion of banks.
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Figure 12: RCS hand drawn map for River Blythe SSSI - Section 1 (040-RS-153001)

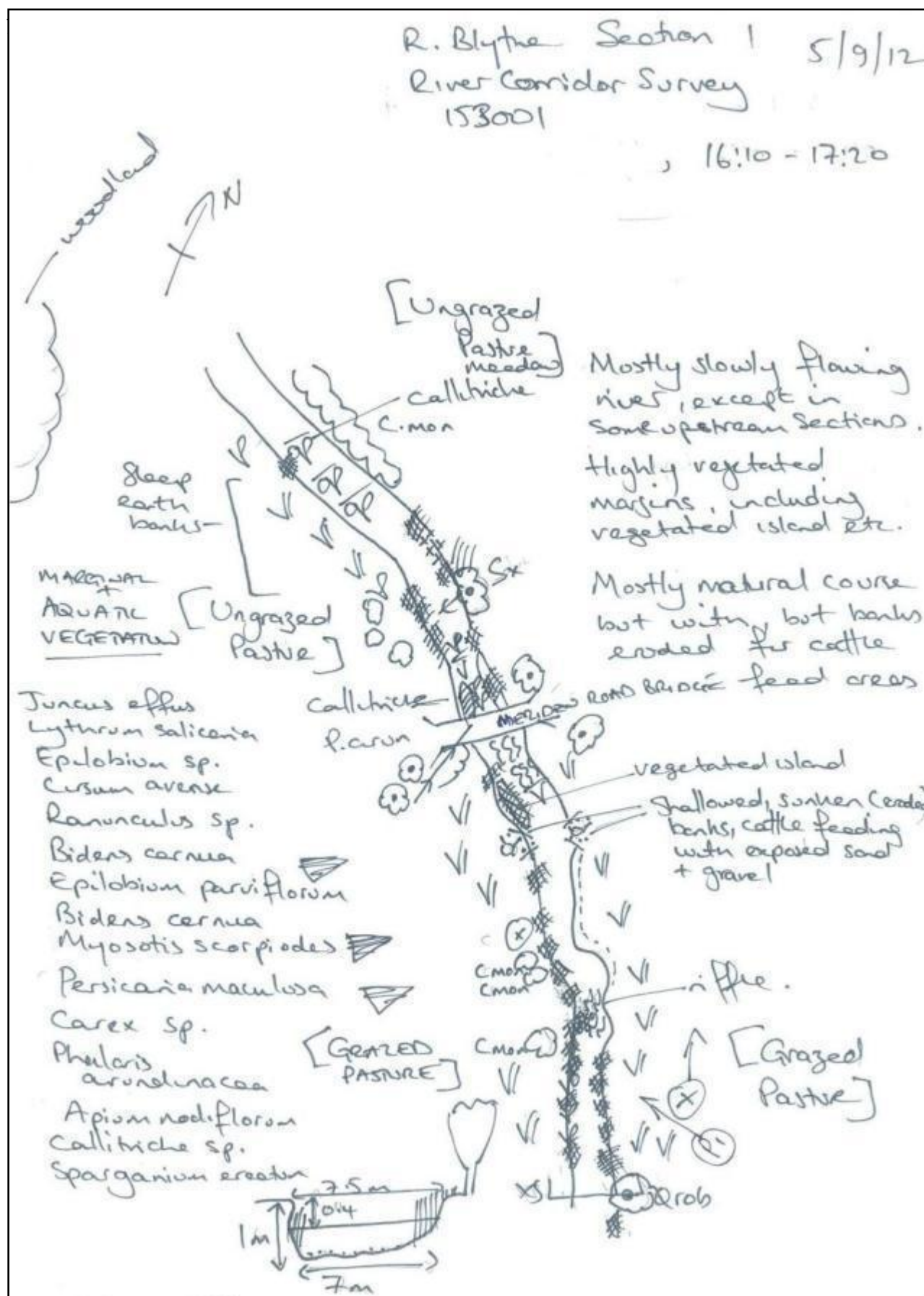


Figure 13: Photograph of River Blythe SSSI - Section 1 (CFA23), photo reference 040-RS1-153001-P-050912



Table 44: RCS results for River Blythe SSSI - Section 2 (CFA23)

Ecology survey code	040-RS1-154001		
Name of watercourse	River Blythe SSSI		
Surveyor(s)	GE	Date	05 September 2012
Survey start	15:10	Survey finish	16:20
Weather conditions	Dry, warm, no preceding rain		
OS Grid Ref (8 digit)	Start Section	SP 212 815	
	End Section	SP 217 817	
Photo Ref(s)	040-RS1-154001-P-050912		
Average width (m)	5.00-6.00		
Average depth (m)	1.20		
Brief description of channel	Approximately 5 to 6m wide, 1.2m deep, meandering watercourse. Muddy/silt substrate in channel (some areas of gravel, meandering, deep and slow flowing lowland river. Highly vegetated in some areas, shaded in others. Base substrate Silted mud, with some areas of gravel. Mature signal crayfish found.		
Base substrate	Generally Silted mud (where visible), with some areas of gravel.		
Bank type (include height, angle and extent of erosion)	left bank	Banks natural and vegetated, relatively steep, 0.8m high and 30°–70° angle.	
	right bank	As left bank. Clear evidence of erosion at cattle feed areas.	
Notable channel features	left bank	Vegetated marginal areas and islands.	
	right bank	As left bank.	
Marginal vegetation (description)	left bank	High vegetation cover in un-shaded areas. Dominant species include branched bur-reed, sedge sp. and yellow water-lily. Other vegetation includes soft rush, reed canary-grass, fool's water-cress, great willowherb, buttercup sp., water-starwort sp., club rush sp. (<i>Schoenoplectus</i> sp.), water forget-me-not and reed sweet-grass (<i>Glyceria maxima</i>).	
	right bank	As left bank.	
Bank zone habitats (description)	left bank	Broadleaf trees (overhanging), reeds and sedges.	
	right bank	As left bank.	
Adjacent land use	left bank	Meadow, pasture fields (grazed) and broadleaved woodland.	
	right bank	As left bank.	
Fauna of interest	Signal crayfish (right bank).		
Recreation features	None observed.		
Existing management	Adjacent to grazed land (evidence of erosion from cattle) but with no evidence of channel management.		
Observed or potential threats to conservation value	Cattle grazing and erosion of banks.		
Suggestions for habitat improvement	Protection from cattle trampling/erosion of banks.		

Figure 14: RCS hand drawn map for River Blythe SSSI - Section2 (040-RS1-154001)

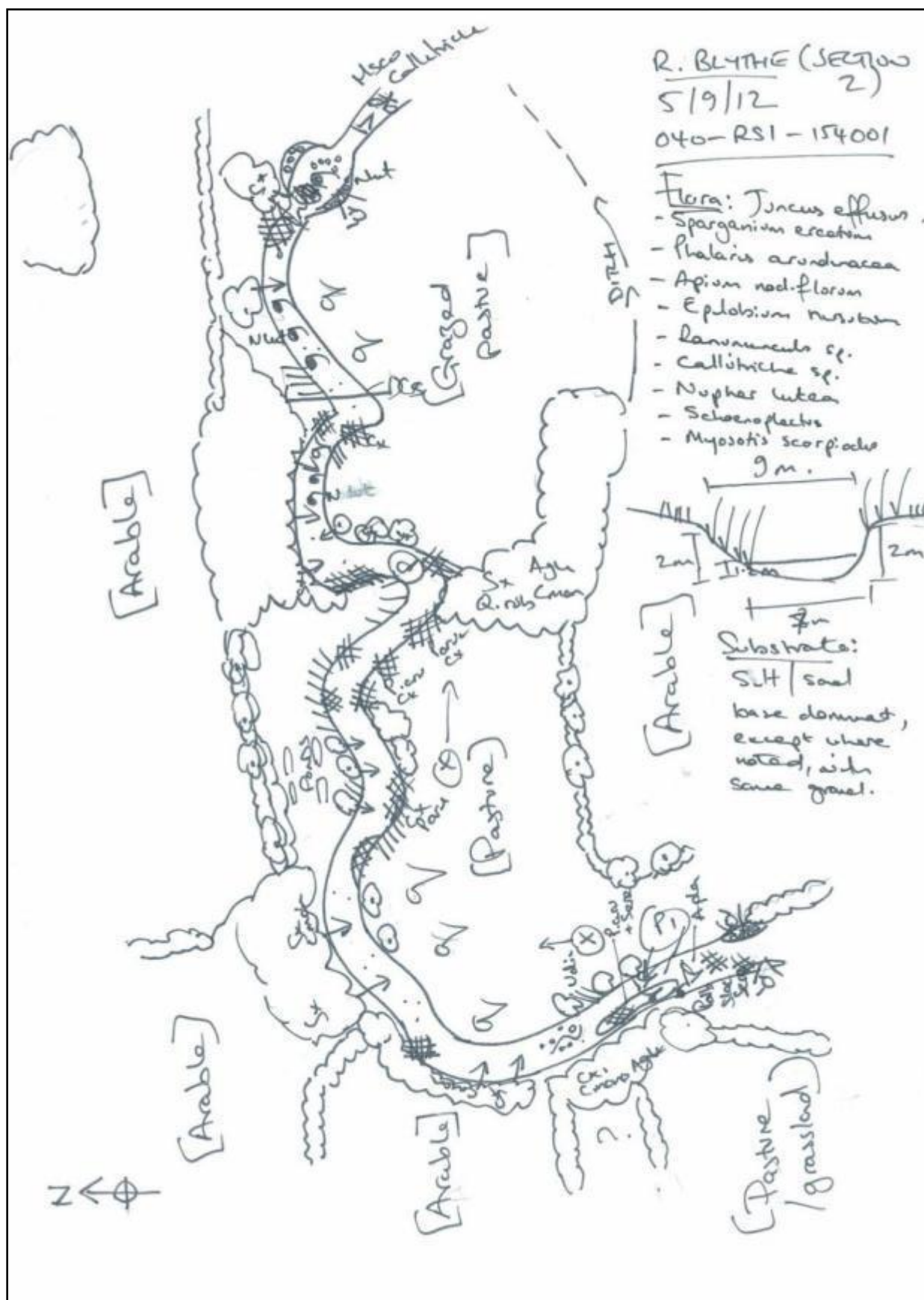


Figure 15: Photograph of River Blythe SSSI - Section 2 (CFA23), photo reference 040-RS1-154001-P-050912



Shadow Brook within the Balsall Common and Hampton-in-Arden area (CFA23)

- 7.4.6 Shadow Brook was a heavily shaded, slow flowing, silt bottomed stream. There was very little or no vegetation, given its location in a broadleaved riparian woodland area. The stream had relatively poor habitat diversity and is of low conservation value.
- 7.4.7 The findings of the RCS are shown in Table 45 and Table 46 and hand drawn figures are shown in Figure 16 and Figure 18. Photographs of the sections of river can be found in Figure 17 and Figure 19.

Table 45: RCS results for Shadow Brook - Section 1 (CFA23)

Ecology survey code	040-RS1-155001 - Section 1		
Name of watercourse	Shadow Brook		
Surveyor(s)	GE; NG	Date	06 September 2012
Survey start	10:20	Survey finish	11:40
Weather conditions	Dry, warm, no preceding rain.		
OS Grid Ref (8 digit)	Start Section	SP 2073 8232	
	End Section	SP 2115 8236	
Photo Ref(s)	040-RS1-155001-P-060912-P1		
Average width (m)	1.20		
Average depth (m)	0.30		
Brief description of channel	Shaded, overhung channel with slow flowing water. Base substrate, mostly silt, with some gravel and sand. Channel features include tree roots, woody dams and debris. Section includes footbridge crossings and a large road bridge (Diddington Lane).		
Base substrate	Silt with some gravel and sand.		
Bank type (include height, angle and extent of erosion)	left bank	Banks natural and highly vegetated. Approx. 1m high and 70° angle on both sides. Bankside habitat includes riparian woodland, dense scrub, herbs/ruderal herbs and grazed pasture.	
	right bank	As left bank.	
Notable channel features	left bank	Occasional riffles and woody debris.	
	right bank	As left bank.	
Marginal vegetation (description)	left bank	Virtually none, given high level of shade. In non-shaded areas soft rush, brooklime and water forget-me-not were recorded.	
	right bank	As left bank.	
Bank zone habitats (description)	left bank	Riparian woodland, scrub and herbs/ruderal herbs.	
	right bank	Riparian woodland, scrub, herbs/ruderal herbs and grazed grassland (semi-improved).	
Adjacent land use	left bank	Pasture/meadow fields (grazed), arable and broad-leaved woodland.	
	right bank	Pasture/meadow fields (grazed), arable and broad-leaved woodland.	
Fauna of interest	None recorded.		
Recreation features	None recorded.		
Existing management	No evidence of recent or current management.		
Observed or potential threats to conservation value	Runoff from agriculture and roads.		
Suggestions for habitat improvement	Removal of some trees adjacent to watercourse to reduce shading.		

Figure 16: RCS hand drawn map for Shadow Brook - Section 1 (040-RS1-155001)

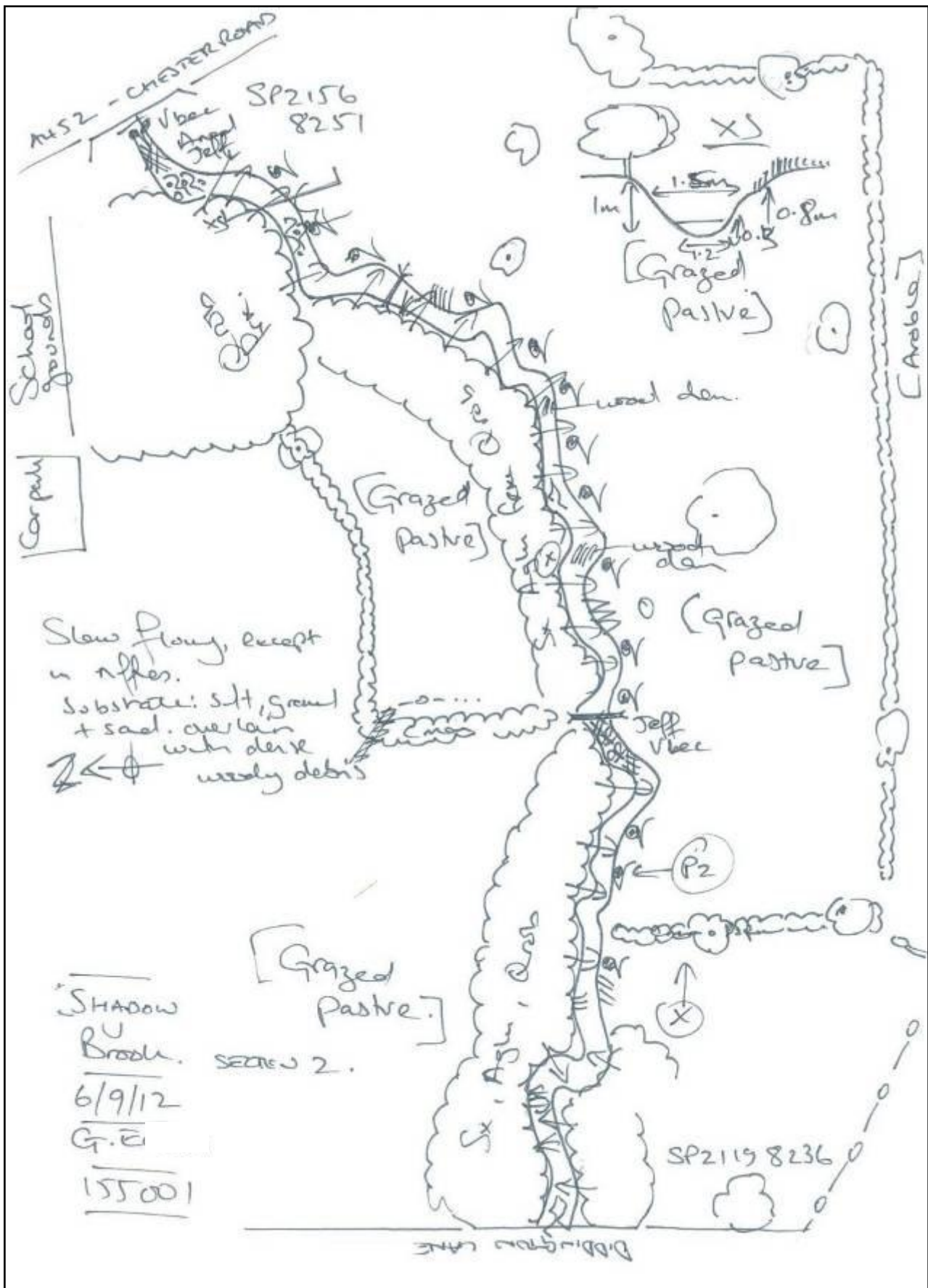


Figure 17: Photograph of Shadow Brook - Section 1 (CFA23), photo reference 040-RS1-155001-P-060912-P1



Table 46: RCS results for Shadow Brook - Section 2 (CFA23)

Ecology survey code	040-RS-155002 - Section 2		
Name of watercourse	Shadow Brook		
Surveyor(s)	GE; NG	Date	06 September 2012
Survey start	11:45	Survey finish	12:40
Weather conditions	Dry, warm and no preceding rain.		
OS Grid Ref (8 digit)	Start Section	SP 2118 8236	
	End Section	SP 2157 8251	
Photo Ref(s)	040-RS1-155002-P-060912-P1		
Average width (m)	1.00		
Average depth (m)	0.30		
Brief description of channel	Shaded, overhung channel with slow flowing water. Base substrate, mostly silt, with some gravel and sand. Channel features included tree roots, woody dams and debris. Section includes three footbridge crossings and a large road bridge.		
Base substrate	Silt with some gravel and sand.		
Bank type (include height, angle and extent of erosion)	left bank	Earth banks natural and highly vegetated. Approx. 0.8-1m high and 50° angle, limited erosion.	
	right bank	As left bank.	
Notable channel features	left bank	Some exposed roots, woody debris, footbridge crossing.	
	right bank	As left bank.	
Marginal vegetation (description)	left bank	Virtually none, given high level of shade. In non-shaded areas soft rush, brooklime and water forget-me-not were recorded.	
	right bank	As left bank.	
Bank zone habitats (description)	left bank	Bankside habitat includes riparian woodland, dense scrub, herbs/ruderal herbs and grazed pasture.	
	right bank	As left bank, but with less woodland.	
Adjacent land use	left bank	Pasture/meadow fields (grazed) and broadleaved woodland, arable, school and car park.	
	right bank	Pasture/meadow fields (grazed) and broadleaved woodland and arable.	
Fauna of interest	None observed.		
Recreation features	None observed.		
Existing management	No evidence of existing or recent management.		
Observed or potential threats to conservation value	Runoff from agriculture and roads.		
Suggestions for habitat improvement	Removal of some trees adjacent to watercourse to reduce shading.		

Figure 18: RCS hand drawn map for Shadow Brook - Section 2 (040-RS1-155002)

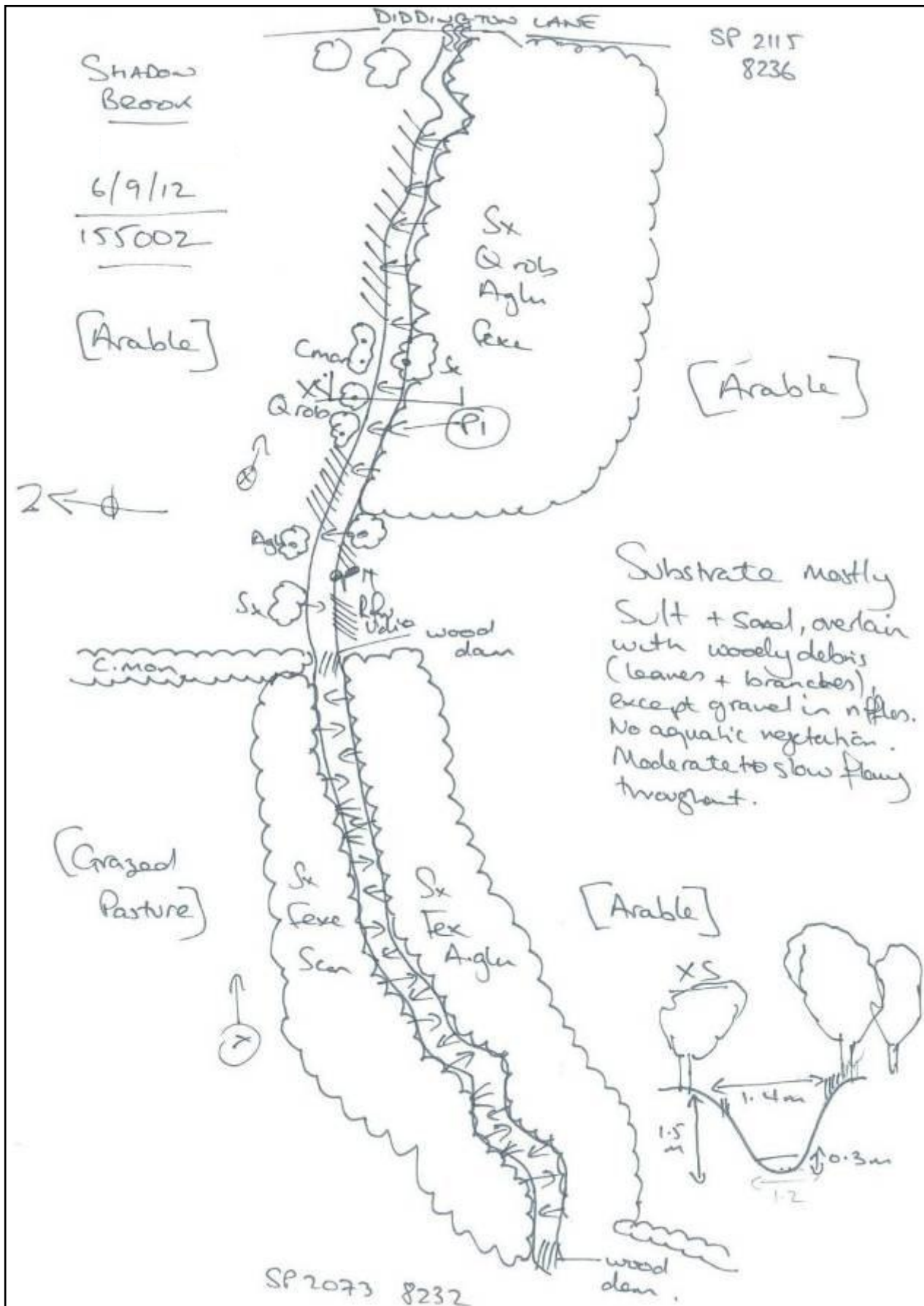


Figure 19: Photograph of Shadow Brook - Section 2 (CFA23), photo reference 040-RS1-155002-P-060912-P1



River Blythe SSSI within the Birmingham Interchange and Chelmsley Wood area (CFA24)

- 7.4.8 The River Blythe within the Birmingham Interchange and Chelmsley Wood area (CFA24), at the Stonebridge island (A45 Coventry Road/A452 Chester Road) has been surveyed and the findings for this section are shown in Table 47 and the hand drawn figure is shown in Figure 20. Photographs of the section of river can be found in Figure 21 and Figure 22.

Table 47: RCS results for River Blythe SSSI (CFA24)

Ecology survey code	040-RS1-155003		
Name of watercourse	River Blythe SSSI		
Surveyor(s)	DB	Date	10 June 2013
Survey start	Not recorded	Survey finish	Not recorded
Weather conditions	Fine, no preceding rain		
OS Grid Ref (8 digit)	Start Section	SP 2141 8319	
	End Section	SP 2150 8368	
Photo Ref(s)	040-RS1-155003-P-100613-P1, 040-RS1-155003-P-100613-P2		
Average width (m)	5-10		
Average depth (m)	1.20		
Brief description of channel	Channel not accessible, observed from bankside. Cobble/gravel at upstream end, otherwise not known. Presence of gravel berm.		
Base substrate	Cobble/gravel at upstream end, otherwise not known.		
Bank type (include height, angle and extent of erosion)	left bank	Earth, 45°-90°. Approx. 3m high.	
	right bank	Earth, marginal toe 45° at upstream end, otherwise near vertical. Erosive earth to 1.5m high.	
Notable channel features	left bank	None.	
	right bank	None.	
Marginal vegetation (description)	left bank	Branched bur-reed, reed canary-grass, common reed and reed sweet-grass.	
	right bank	As left bank.	
Bank zone habitats (description)	left bank	Scrub and tall grass/tall herb.	
	right bank	Grazed pasture.	
Adjacent land use	left bank	Arable.	
	right bank	Rough pasture.	
Fauna of interest	Habitat appears suitable for water vole.		
Recreation features	Footpath on left bank.		
Existing management	Agriculture on adjacent land, no obvious management of channel.		
Observed or potential threats to conservation value	Alder die-back.		
Suggestions for habitat improvement	None.		

Figure 20: RCS hand drawn map for River Blythe SSSI (040-RS1-155003)

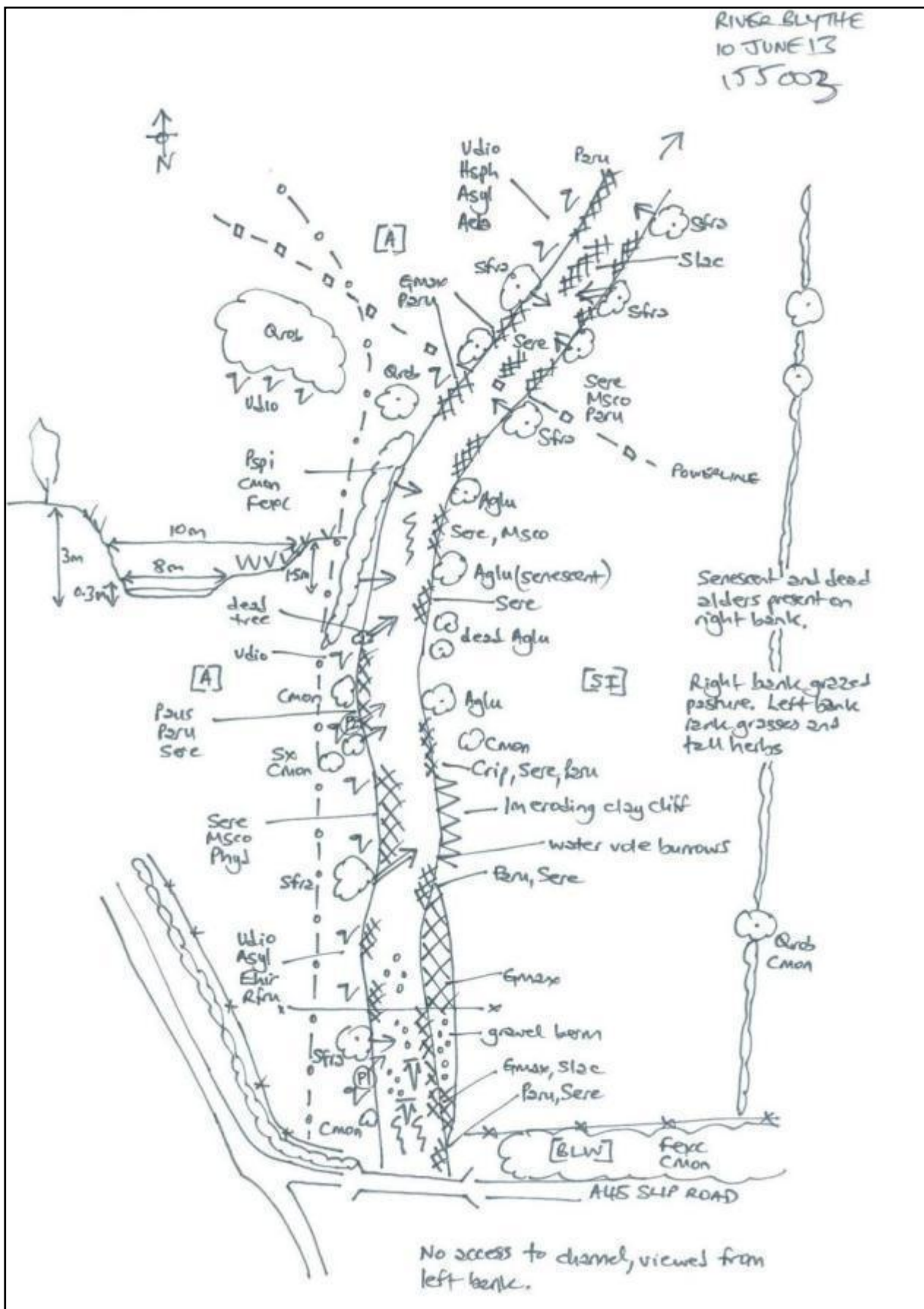


Figure 21: Photograph of River Blythe SSSI (CFA24), photo reference 040-RS1-155003-P-100613-P1



Figure 22: Photograph of River Blythe SSSI (CFA24), photo reference 040-RS1-155003-P-100613-P2



Hollywell Brook within the Birmingham Interchange and Chelmsley Wood area (CFA24)

- 7.4.9 Hollywell Brook was a small, moderately flowing stream with varied substrate, vegetation and plant diversity.
- 7.4.10 A RCS was undertaken on Hollywell Brook on three different sections. The principal results of this survey are shown in Table 48, Table 49 and Table 50. Hand drawn figures are shown in Figure 23, Figure 26 and Figure 29. Photographs of the sections of river can be found in Figure 24, Figure 25, Figure 27, Figure 28, Figure 30 and Figure 31.

Table 48: RCS results for Hollywell Brook - Section 1 (CFA24)

Ecology survey code	040-RS1-156001- Section 1		
Name of watercourse	Hollywell Brook		
Surveyor(s)	GE; DB; NG	Date	07 September 2012; 10 June 2013
Survey start	Not recorded	Survey finish	Not recorded
Weather conditions	Fine, no preceding rain		
OS Grid Ref (8 digit)	Start Section	SP 2076 8354	
	End Section	SP 2119 8369	
Photo Ref(s)	040-RS1-156001-p-070912-P1; 040-RS1-156001-p-070912-P2;		
Average width (m)	3.50		
Average depth (m)	0.10		
Brief description of channel	Gently meandering and narrow channel, perhaps historically deepened downstream of A452 with some areas of shading (woodland). Substrate dominated by silt upstream of the A452, while gravels dominate downstream. Fallen trees in channel from bankside woodland.		
Base substrate	Dominated by silt upstream of A452 Chester Road, and gravel downstream of A452 Chester Road.		
Bank type (include height, angle and extent of erosion)	left bank	Earth, near vertical to 1.5m.	
	right bank	As left bank.	
Notable channel features	left bank	None.	
	right bank	Fallen trees from bank in woodland.	
Marginal vegetation (description)	left bank	Lesser pond sedge, meadowsweet, great willowherb in non-shaded areas.	
	right bank	As left bank.	
Bank zone habitats (description)	left bank	Broad-leaved woodland and scrub. Rough grassland.	
	right bank	As left bank.	
Adjacent land use	left bank	Arable and woodland.	
	right bank	Arable, woodland and pasture.	
Fauna of interest	None observed.		
Recreation features	Footpath crosses at downstream end.		
Existing management	None obvious.		
Observed or potential threats to conservation value	Abundant green filamentous algae downstream of A452 Chester Road. Brook crossed by a footbridge (slumped, which may impede flow, leading to damming/siltation) and a large road bridge (A452 Chester Road). Increased shading would be detrimental.		
Suggestions for habitat improvement	Improve bank profile.		

Figure 23: RCS hand drawn map for Hollywell Brook - Section 1 (040-RS1-156001)

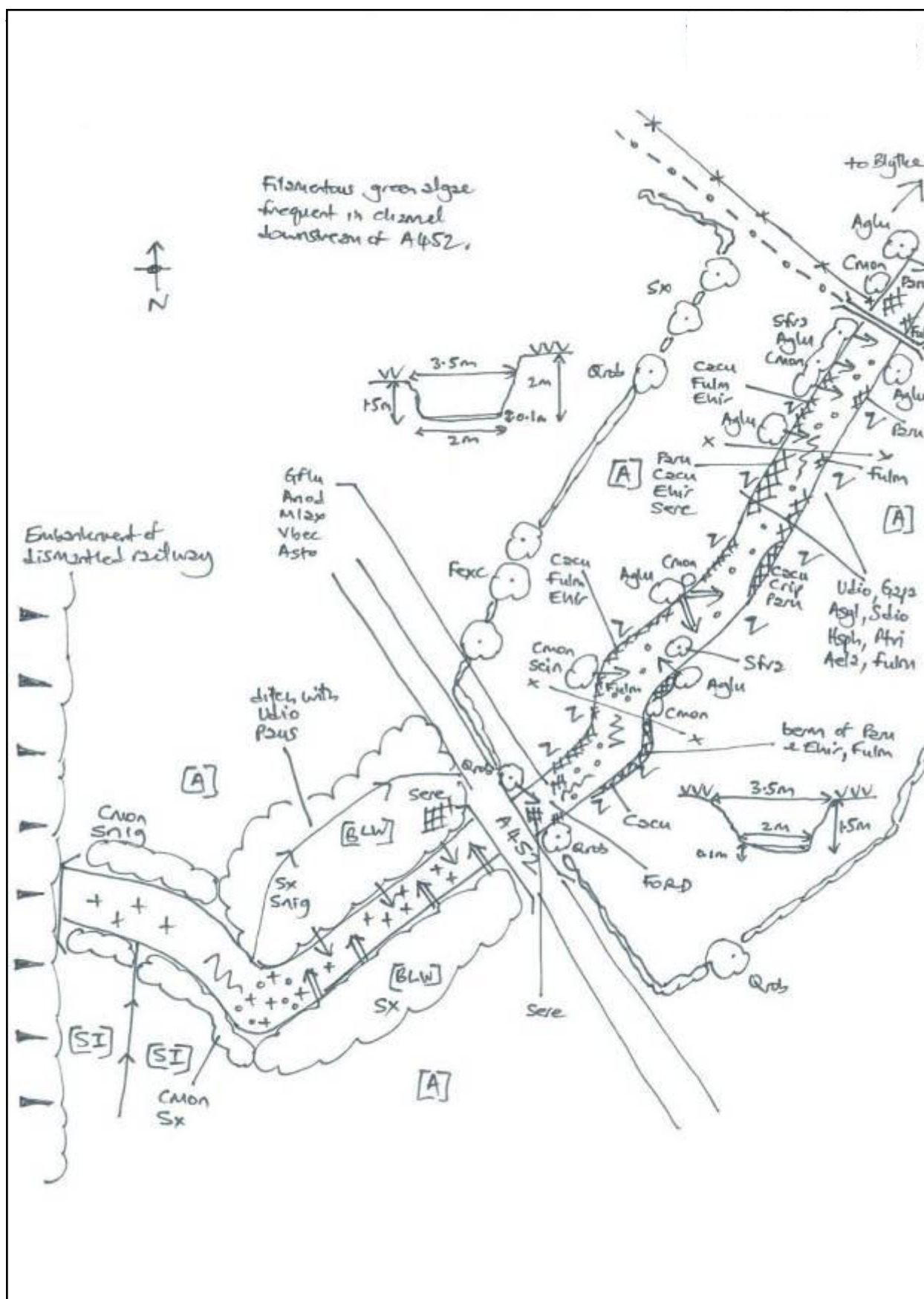


Figure 24: Photograph of Hollywell Brook - Section 1 (CFA24), photo reference 040-RS1-156001-p-070912-P1



Figure 25: Photograph of Hollywell Brook - Section 1 (CFA24), photo reference 040-RS1-156001-p-070912-P2



Table 49: RCS results for Hollywell Brook - Section 2 (CFA24)

Ecology survey code	040-RS-156002 - Section 2		
Name of watercourse	Hollywell Brook		
Surveyor(s)	GE; DB; NG	Date	07 September 2012; 10 June 2013
Survey start	Not recorded	Survey finish	Not recorded
Weather conditions	Fine, no preceding rain		
OS Grid Ref (8 digit)	Start Section	SP 203 837	
	End Section	SP 207 836	
Photo Ref(s)	040-RS1-156002-p-070912-P1, 040-RS1-156002-p-070912-P2		
Average width (m)	0.80		
Average depth (m)	0.10-0.20		
Brief description of channel	Narrow meandering channel, slow flowing watercourse with extensive marginal and emergent vegetation with no significant shading. Substrate was mostly silt deposits (where flow impeded by emergent vegetation) over gravels. Immature signal crayfish found.		
Base substrate	Silt deposits over gravel.		
Bank type (include height, angle and extent of erosion)	left bank	As right bank.	
	right bank	Banks natural and highly vegetated. Approx. 0.5m high and 45° angle.	
Notable channel features	left bank	None.	
	right bank	None.	
Marginal vegetation (description)	left bank	Dense and fairly diverse. Greater pond sedge and lesser pond sedge, flowering rush (<i>Butomus</i> sp.), soft rush, branched bur-reed, greater willowherb and thistle (<i>Cirsium</i> sp.).	
	right bank	As left bank.	
Bank zone habitats (description)	left bank	Grassland (pasture) and sedge beds.	
	right bank	As left bank with pond at downstream end.	
Adjacent land use	left bank	Surrounding land use: pasture/meadow fields (grazed), broadleaved woodland and arable. Some semi-improved pasture.	
	right bank	As left bank.	
Fauna of interest	Signal crayfish.		
Recreation features	None.		
Existing management	Grazing of banks.		
Observed or potential threats to conservation value	Increased shading if trees/shrubs increase in extent.		
Suggestions for habitat improvement	Bring adjacent meadows into nature conservation management.		

Figure 26: RCS hand drawn map for Hollywell Brook - Section 2 (040-RS1-156002)

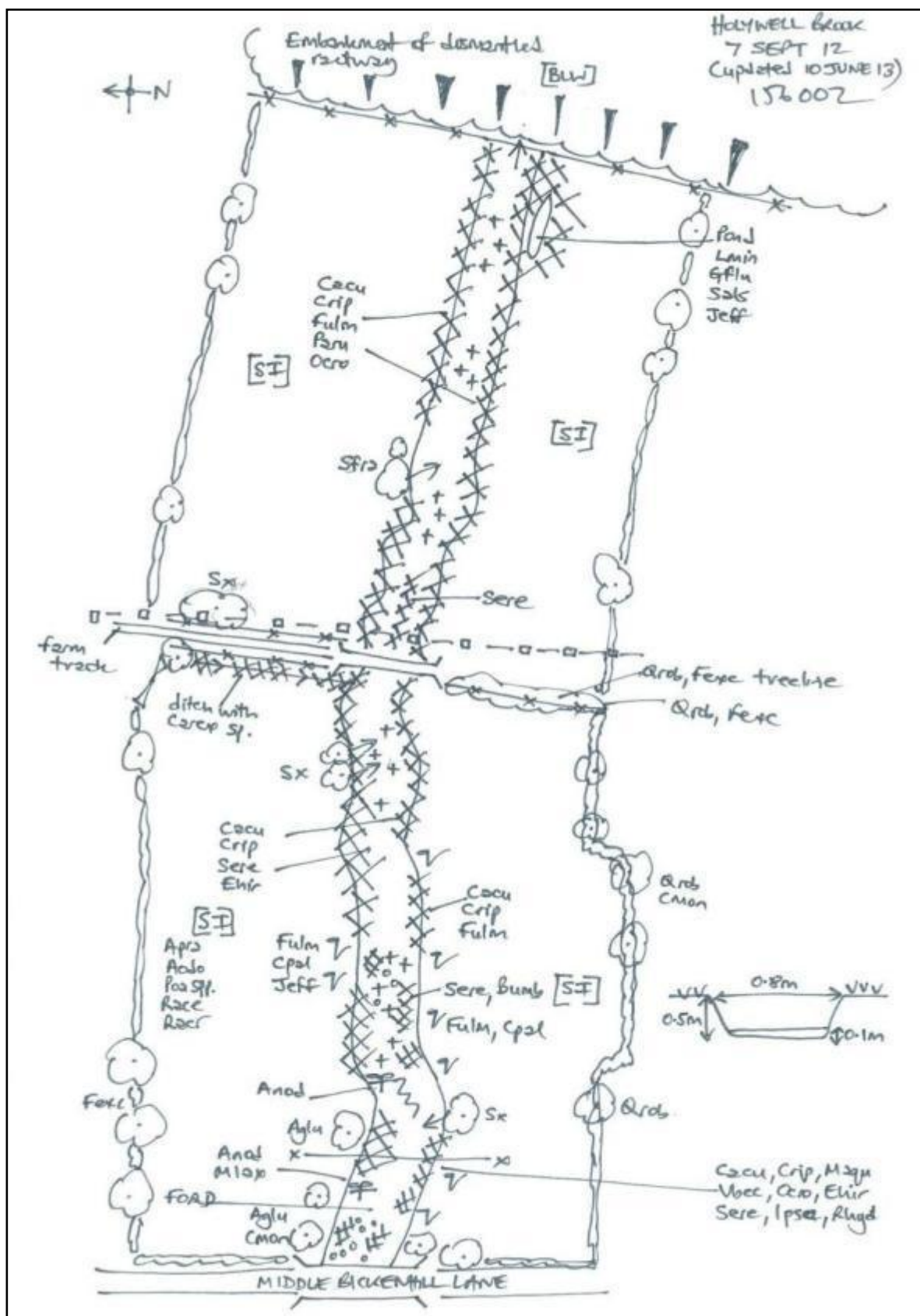


Figure 27: Photograph of Hollywell Brook - Section 2 (CFA24), photo reference 040-RS1-156002-p-070912-P1



Figure 28: Photograph of Hollywell Brook - Section 2 (CFA24), photo reference 040-RS1-156002-p-070912-P2



Table 50: RCS results for Hollywell Brook - Section 3 (CFA24)

Ecology survey code	040-RS1-156003		
Name of watercourse	Hollywell Brook - Section 3		
Surveyor(s)	GE	Date	10 June 2013
Survey start	Not recorded	Survey finish	Not recorded
Weather conditions	Fine, no preceding rain		
OS Grid Ref (8 digit)	Start Section	SP 1993 8365	
	End Section	SP 2028 8370	
Photo Ref(s)	040-RS1-156001-P-100613-P1 to P2		
Average width (m)	5.00		
Average depth (m)	0.10		
Brief description of channel	Heavily shaded, historically realigned and deepened channel, ponded at downstream end where channel has been widened (spoil still present as adjacent mound). Base substrate silt, except very locally where fine gravels and sands occur.		
Base substrate	Silt with local areas of fine gravels and sand.		
Bank type (include height, angle and extent of erosion)	left bank	Earth banks (45°-80°), heavily scrubbed. Approx. 1-2m high, eroded earth. Extensive cattle poaching of margins eroded at upstream end.	
	right bank	As left bank.	
Notable channel features	left bank	None.	
	right bank	None.	
Marginal vegetation (description)	left bank	Water figwort, great willowherb, fine-leaved water-dropwort, fool's water-cress, water plantain (<i>Alismo plantago-aquatica</i>), water starwort sp. and common reed.	
	right bank	Diverse in ponded area (see map) otherwise as left bank.	
Bank zone habitats (description)	left bank	Heavily scrubbed for much of length.	
	right bank	As left bank, but open by pond.	
Adjacent land use	left bank	Semi-improved pasture.	
	right bank	As left bank.	
Fauna of interest	None observed.		
Recreation features	None.		
Existing management	Grazing of banks (except where fenced).		
Observed or potential threats to conservation value	On-going siltation, increased shade and excessive cattle poaching.		
Suggestions for habitat improvement	Improve bank profile; reduce shading from trees and shrubs.		

Figure 29: RCS hand drawn map for Hollywell Brook - Section 3 (040-RS1-156003)

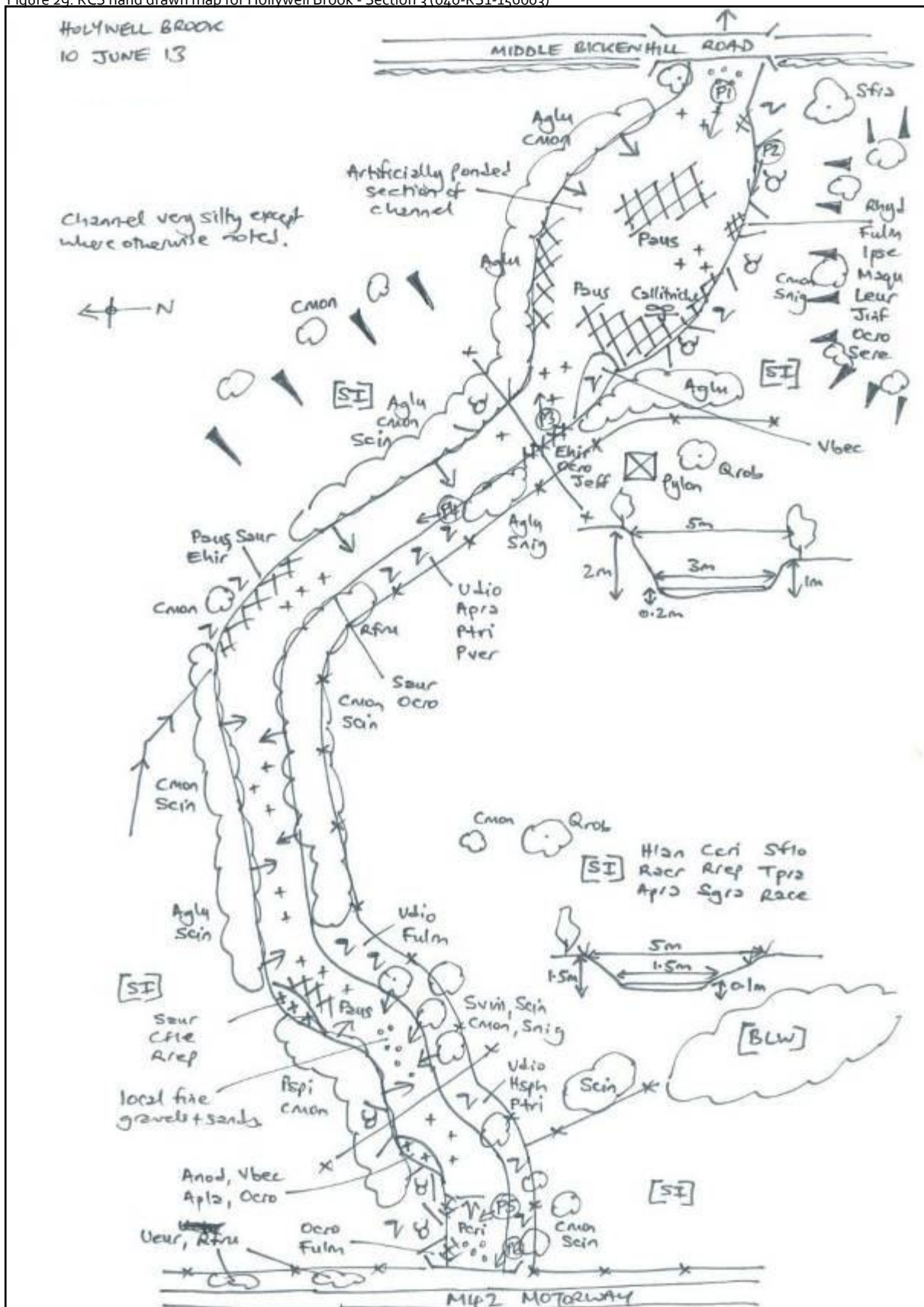


Figure 30: Photograph of Hollywell Brook - Section 3 (CFA24), photo reference 040-RS1-156001-P-100613-P1



Figure 31: Photograph of Hollywell Brook - Section 3 (CFA24), photo reference 040-RS1-156001-P-100613-P2



River Tame SLINC within the Castle Bromwich and Bromford area (CFA25)

- 7.4.12 The River Tame SLINC was a large, realigned watercourse. It had stone/concrete banks with planted trees, localised areas of rough grass, bramble and tall herbs. The bed substrate was natural with extensive beds of river water crow-foot. The water depth along this section of the River Tame SLINC increases rapidly by almost 2m following heavy rainfall, but also quickly recedes. The channel is steep sided with few overflow points.
- 7.4.13 RCS were undertaken on four different sections of the River Tame SLINC, all of which were within the Castle Bromwich and Bromford area (CFA25). The results of this survey are shown in Table 51, Table 52, Table 53 and Table 54. Hand drawn figures are shown in Figure 32, Figure 33, Figure 35, Figure 36, Figure 38 and Figure 40. Photographs of the sections of river can be found in Figure 34, Figure 37, Figure 39 and Figure 41.

Table 51: RCS results for River Tame SLINC - Section 1 (CFA25)

Ecology survey code	040-RS1-166001 - Section 1		
Name of watercourse	River Tame SLINC		
Surveyor(s)	KA; RR; NW; PS	Date	10 October 2012; 16 October 2012
Survey start	13:00	Survey finish	18:00
Weather conditions	Windy, sunny intervals, dry (rained last night)		
OS Grid Ref (8 digit)	Start Section	SP 16166 91173	
	End Section	SP 15739 90943	
Photo Ref(s)	040-RS1-166001-P-101012		
Average width (m)	12.50		
Average depth (m)	Greater than 2m in places leading up to first rail bridge, then 50cm to 1m after rail bridge and prior to next rail bridge.		
Brief description of channel	<p>The channel width is an average of 10m wide and of unknown depth more than 2m. Deep with glides and areas of turbid water channel. There is a small pool within the outfall from the large water body water body within Park Hall SINC with common toad tadpole present and small areas of marginal vegetation. A clear span pedestrian bridge is present in this section but is fenced off to avoid vandals reaching the National Rail property. Few areas of marginal vegetation are present, restricted to areas with shallower waters and gravel beds. Where present, these are dominated by stands of river water crowfoot. The water depth remains deep alongside the remains of the old farm (area of brick wall and semi-mature trees and scrub) and beyond until just near to the rail bridge. Prior to the rail bridge the channel has burst through the flood bank and deposited gravels and flood debris.</p> <p>As the channel gets near to the rail bridge the river is shallower on the approach to the seven7 span (4four in-channel piers) rail bridge with gravel bars forming both upstream and downstream of the piers. These bars are largely un-vegetated although some have Indian balsam or have flood debris (currently a tree trunk) partially blocking the bridge spans. The channel depth is observed to increase dramatically following heavy rainfall by almost 2m, but also recedes quickly. The channel is mostly steep sided with only a few overflow points, so water travels downstream past Park Hall relatively quickly.</p>		
Base substrate	Gravels and cobbles where evident, elsewhere too deep to see, but likely to be some silts where adjacent banks are undercut.		
Bank type (include height, angle and extent of erosion)	left bank	Mostly 70° to 80° of unstable earth bank, some areas appear narrow prior to the adjacent rail corridor - 4 to 9m width.	
	right bank	90° angle or undercut edge can be up 2m high. Unstable earth bank.	
Notable channel features	left bank	Gravels prior to rail bridge and gravel bars at piers. Footbridge and two rail crossings.	
	right bank	Gravels prior to rail bridge and gravel bars at piers. Footbridge and two rail crossings. Flood bank prior to first rail bridge has been cut away by floodwater, leaving steep earth cliffs much urban and natural flood debris in the floodplain.	
Marginal vegetation (description)	left bank	No marginal vegetation was observed up to the first rail crossing. Only areas where the bank has sumped show signs of marginal vegetation, the left hand bank has a few areas where this has occurred, with only sparse marginal vegetation comprising bankside grasses that have entered the channel and/or patches of Indian balsam.	
	right bank	No marginal vegetation was observed in this section.	
Bank zone habitats	left bank	Dominated by stands of bramble, which are covered with hedge bindweed and	

(description)		<p>Ivy agg., which overhang the edge. Between stands of bramble are a few stands of tall ruderal vegetation of Indian balsam and common nettle. Trees are more occasional and include ash, willow species, hawthorn and rowan. The bank here is wider before the Network Rail land and can be accessed via the pedestrian bridge when the fencing has been vandalised. This area opens out into an area of open grassland and tall ruderal vegetation, with an artificial otter holt reported to be present¹²⁷. Japanese knotweed is also present on this bank in this location.</p> <p>After the first rail bridge the left bank is unstable having both slumped areas and undercut areas, the lack of vegetation on the adjacent steep bank here (intensively managed by Minworth sewage treatment works) is of concern as the lack of cover reduces the ground stability and the severity of flood incidents indicate this may well be damaged in the near future. There are occasional large crack willow trees, but these have heavily exposed roots and appear likely to fall into the channel in the near future. Nearer the three span brick rail bridge there is a small area of planted silver birch.</p>
	right bank	<p>Unstable and undercut in places. Immediately after the clear span pedestrian bridge is an inaccessible area of scrub vegetation with occasional semi-mature trees of ash and pedunculate oak, beyond this is a sunken area containing bridge pond and dense areas of nettles and young hawthorn trees. East of this is a partially enclosed area with areas of rank grassland dominated by false oat-grass and common couch, and monospecific stands of tall ruderal vegetation and scrub habitat comprising common nettle, broad-leaved dock and impenetrable bramble. Further east is an area of lush floodplain grassland (which becomes very species rich further east) with occasional scrub of hawthorn and dog rose. Some scrub is associated with old hedge lines and again areas of dense and occasionally impenetrable bramble. The flood bund commences again here, but has been worn away near to the rail line leaving tall sandy banks and vast areas of urban and natural flood debris which covers the floodplain grassland. Beyond this are further habitats of marshy grassland, marsh, open water, scrub, ancient woodland and horse grazed pastures.</p> <p>After the first rail bridge the right bank has been stabilised and is man-made. Beyond this are dense areas of tall ruderal vegetation, dense scrub and woodland comprising hawthorn, silver birch, ash and pedunculate oak, with dense ivy cover which drapes over the three span (two central piers) brick rail bridge.</p>
Adjacent land use	left bank	Network Rail land, beyond which is Minworth sewage treatment works.
	right bank	Park Hall SINC, with ponds, reed beds, grassland, scattered trees and scrub, beyond which is the M6 southbound carriageway.
Fauna of interest	Kingfisher observed flying downstream. Otter and signal crayfish.	
Recreation features	None.	
Existing management	Managed by the Environment Agency and Birmingham and Black Country Wildlife Trust. Whole site is grazed year round by long-horn cattle.	
Observed or potential threats to conservation value	Invasive species Japanese knotweed and Indian balsam present.	
Suggestions for habitat improvement	Reduction in longevity of cattle grazing and management of invasive plant species. Some bank re-enforcement may be required in the locations where the bank is close to Network Rail land and in areas adjacent to Minworth sewage treatment works.	

¹²⁷ Conservation Projects Manager (pers. comm. 25-4-12),

Figure 32: RCS hand drawn map for River Tame SLINC- Section 1 (040-RS1-166001)

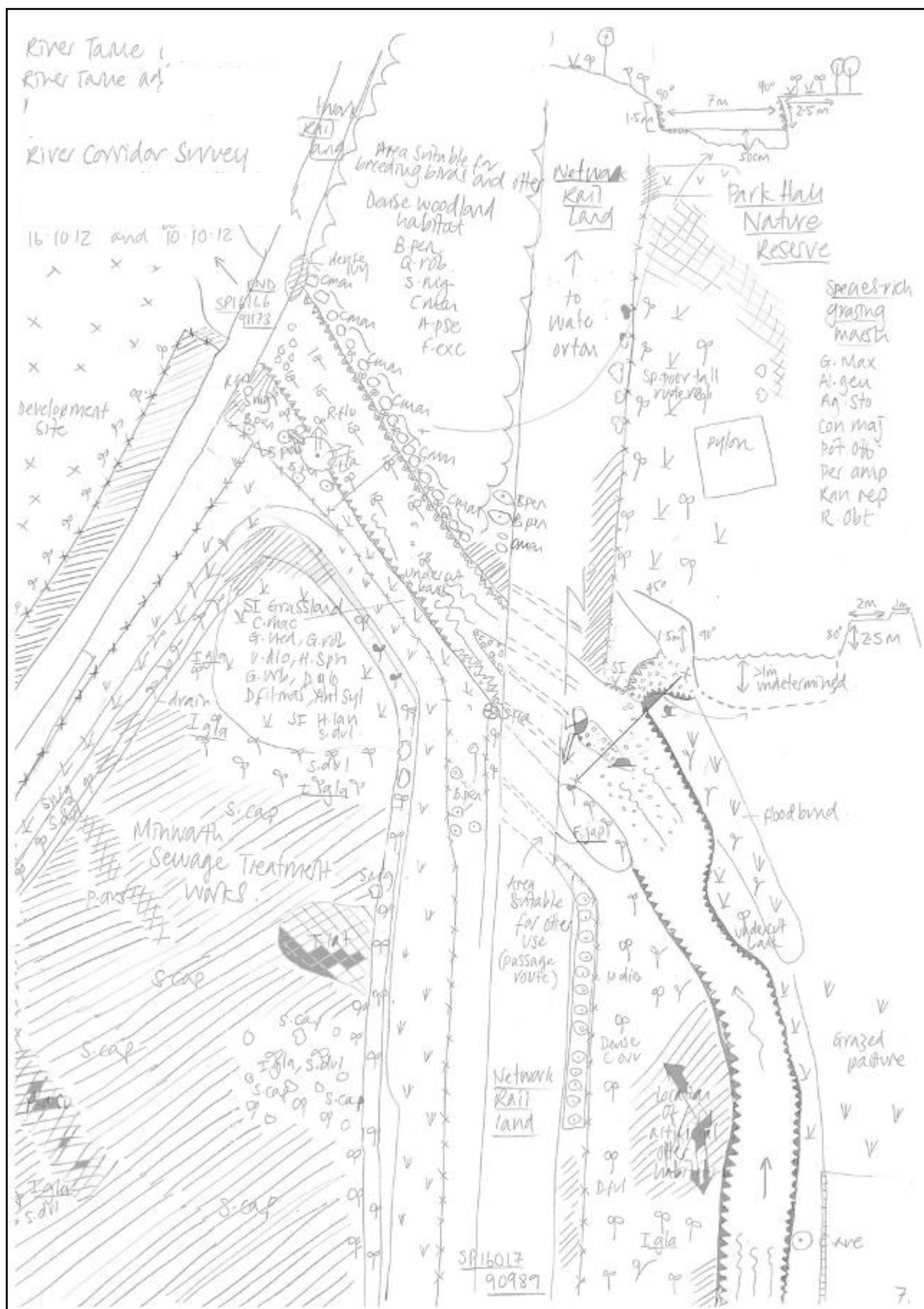


Figure 33: RCS hand drawn map for River Tame SLINC- Section 1 (040-RS1-166001)

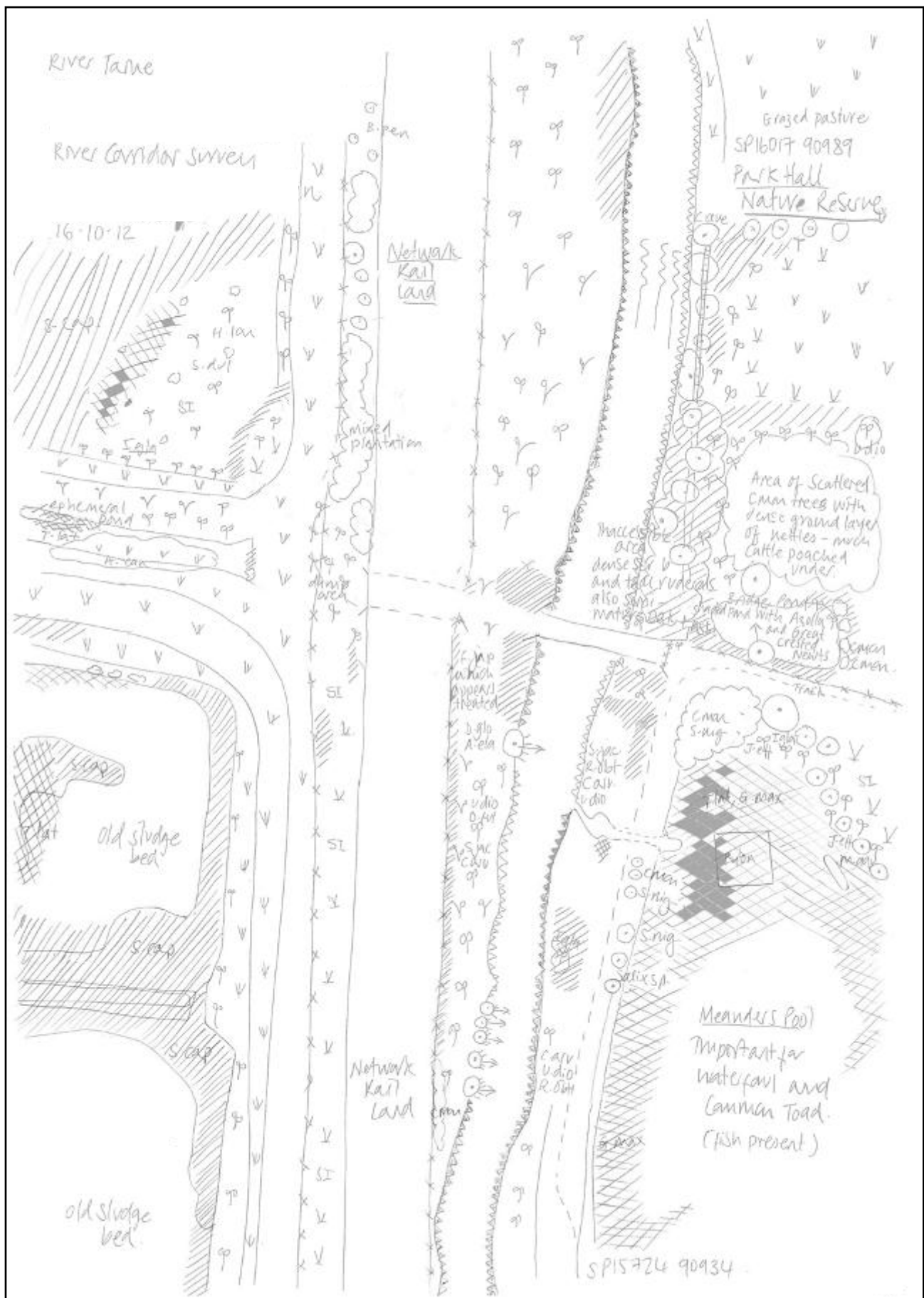


Figure 34: Photograph of River Tame SLINC - Section 1 (CFA25), photo reference 040-RS1-166001-P-101012



Table 52: RCS results for River Tame SLINC - Section 2 (CFA25)

Ecology survey code	040-RS1-166002		
Name of watercourse	River Tame SLINC - Section 2		
Surveyor(s)	NW;JB	Date	24 October 2012
Survey start	15:00	Survey finish	17:00
Weather conditions	Grey overcast, light wind and light rain/drizzle all afternoon		
OS Grid Ref (8 digit)	Start Section	SP 15288 90800	
	End Section	SP 15739 90943	
Photo Ref(s)	040-RS1-166002-P-241012		
Average width (m)	8.00		
Average depth (m)	1.00		
Brief description of channel	Shallow over gravels with much in-channel vegetation dominated by large stands of river water crowfoot. Depth is observed to increase dramatically following heavy rainfall by almost 2m, but also recedes quickly. Mostly steep sided with only a few overflow points, so water travels downstream past Park Hall SINC relatively quickly.		
Base substrate	Gravels to silts		
Bank type (include height, angle and extent of erosion)	left bank	Shelves move gently towards water's edge but still unstable: 3m high at 45° angle, bank edge appears stable when supported by dense tall ruderal growth, common nettle, hedge bindweed (<i>Calystegia sylvatica</i>) and occasional trees such as ash.	
	right bank	1.50m to 2m tall at 90°, generally unstable and undercut in places, but this is mostly obscured by overhanging tall ruderal vegetation.	
Notable channel features	left bank	Occasional riffles, general glides.	
	right bank	Right angle to water.	
Marginal vegetation (description)	left bank	Colonising marginal vegetation, including reed canary-grass, reed sweet-grass, brooklime and branched bur-reed and some areas of slumped bank or areas where silts have been trapped behind urban debris are colonised by Indian balsam.	
	right bank	Limited areas of marginal vegetation due to steep bank sides and overhanging vegetation.	
Bank zone habitats (description)	left bank	45° and covered with areas of tall ruderal vegetation dominated by common nettle, broad-leaved dock Adjacent dense bramble scrub habitats entwined with hedge bindweed. Bankside trees are more occasional and include ash and rowan.	
	right bank	Rank grassland dominated by false oat-grass and common couch, and mono-specific stands of common nettle, broad-leaved dock, soapwort (<i>Saponaria officinalis</i>), mugwort (<i>Artemisia vulgaris</i>), and wormwood (<i>Artemisia absinthium</i>). In one location there is a stand of approximately 160 Dittander (a Nationally Scarce species) plants. The flood bund has blown out at one location allowing flood water to spill into species-poor, semi-improved grassland, species-rich marsh grassland and wet woodland habitats.	
Adjacent land use	left bank	Network Rail land, beyond which, are rough and amenity habitats associated with the playing fields at Castle Vale and Minworth sewage treatment works.	

	right bank	Park Hall SINC, beyond which is the M6 southbound carriageway.
Fauna of interest	Otter and signal crayfish.	
Recreation features	None- Park Hall SINC has no public access.	
Existing management	Managed by the Environment Agency and Birmingham and Black Country Wildlife Trust. Whole site is grazed year round by long-horn cattle.	
Observed or potential threats to conservation value	Invasive species Japanese knotweed and Indian balsam present.	
Suggestions for habitat improvement	Reduction of cattle grazing, management of invasive species. Monitor and manage to retain dittander.	

Figure 35: RCS hand drawn map for River Tame SLINC - Section 2 (040-RS1-166002)

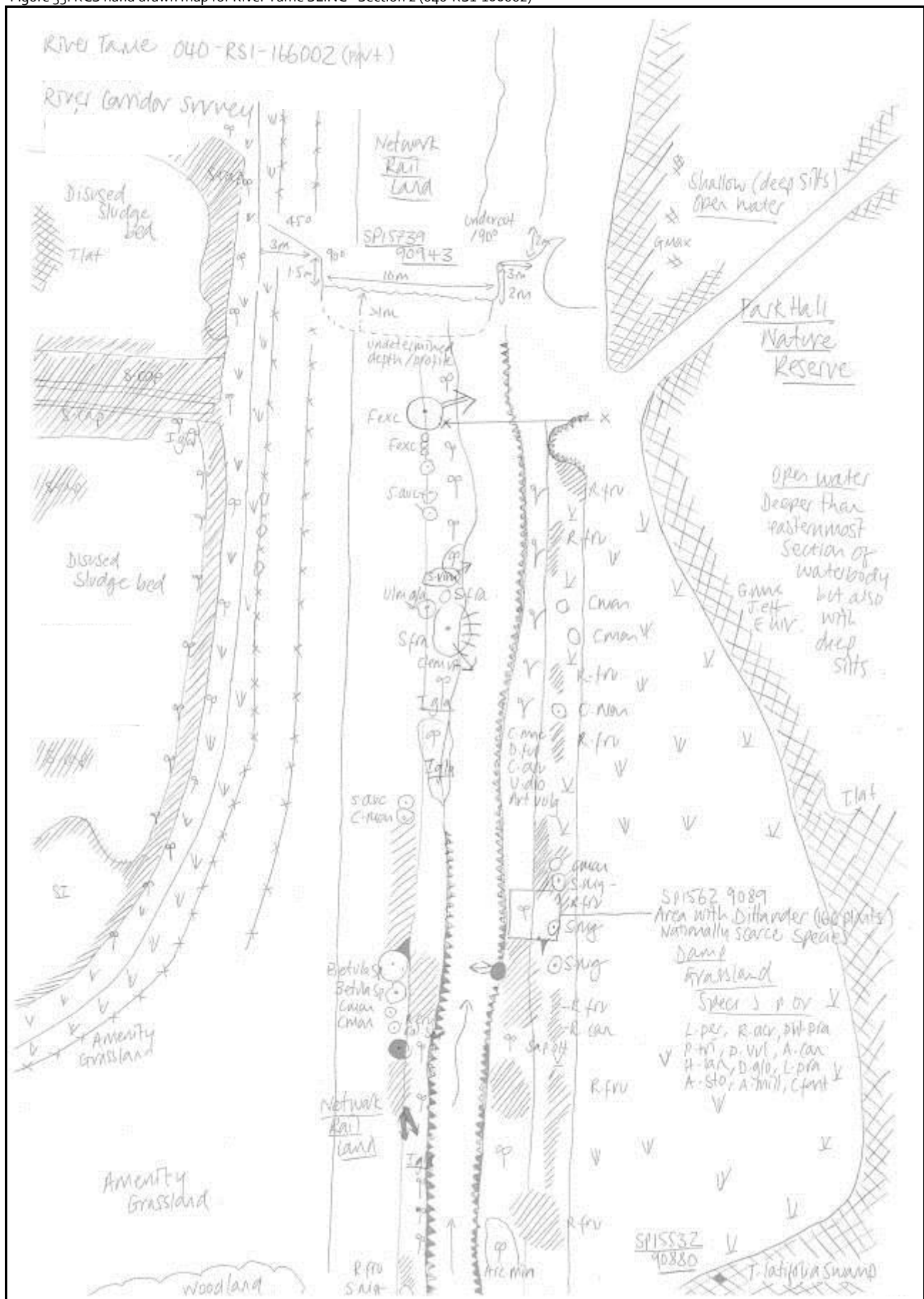


Figure 36: RCS hand drawn map for River Tame SLINC- Section 2 (040-RS1-166002)

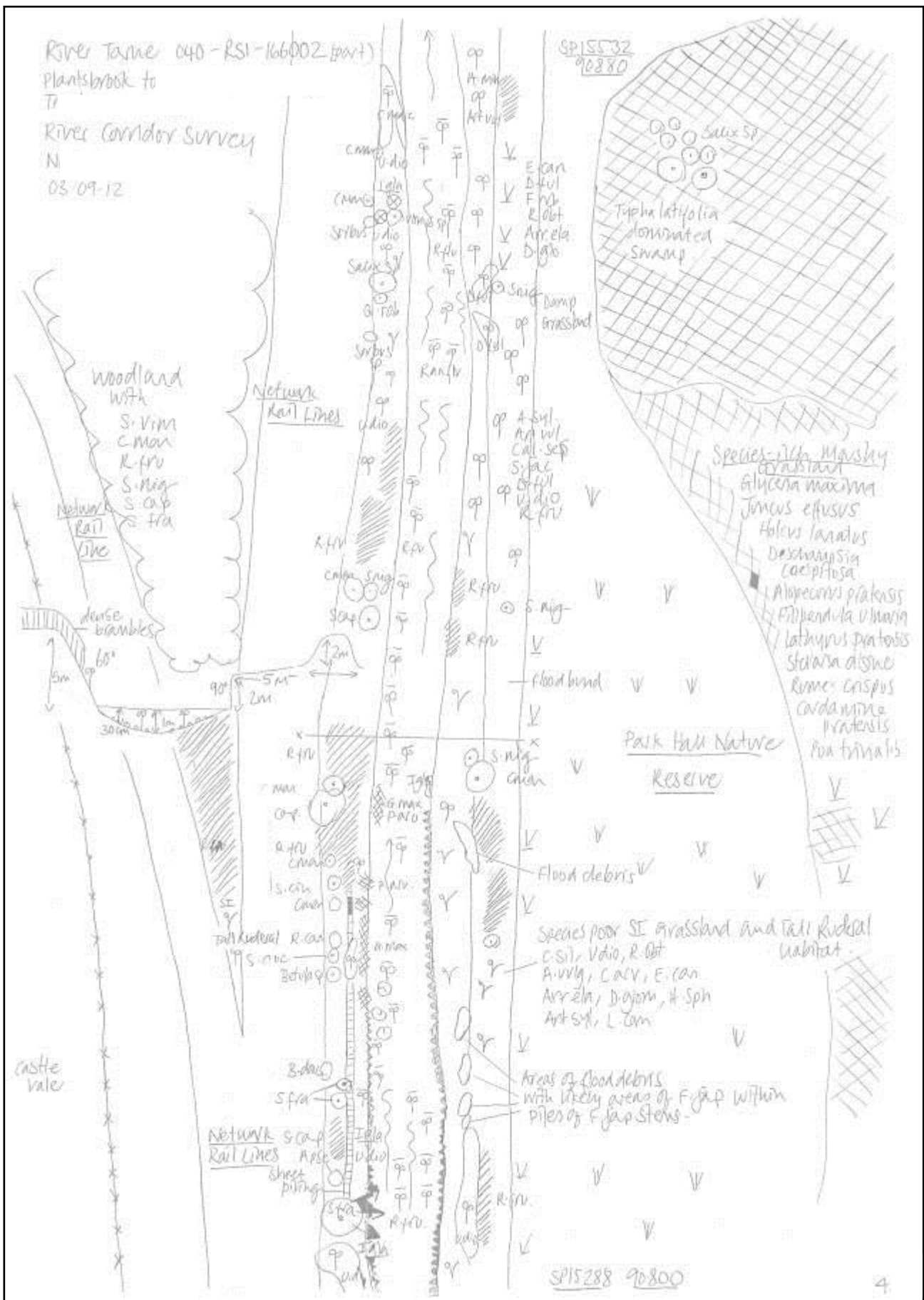


Figure 37: Photograph of River Tame SLINC - Section 2 (CFA25), photo reference 040-RS1-166002



Table 53: RCS results for River Tame SLINC - Section 3 (CFA25)

Ecology survey code	040-RS1-166003- Section 3		
Name of watercourse	River Tame SLINC		
Surveyor(s)	NW; OB	Date	26 July 2012
Survey start	None recorded	Survey finish	None recorded
Weather conditions	Dry, warm, sunny		
OS Grid Ref (8 digit)	Start Section	SP 15288 90800	
	End Section	SP 14765 90597	
Photo Ref(s)	040-RS1-166003-P-260712		
Average width (m)	11.00		
Average depth (m)	1.00 (at low flow)		
Brief description of channel	Water flow is steady to fast flowing, over gravels with turbulence where deeper water is present. The channel depth within the River Tame SLINC is observed to increase dramatically following heavy rainfall by almost 2m, but also recedes quickly too. It is mostly steep sided with only a few overflow points, so water travels downstream past Park Hall relatively quickly.		
Base substrate	Gravel and silts (some areas difficult to tell due to deep water).		
Bank type (include height, angle and extent of erosion)	left bank	Steep earth bank 45°. Occasional bank slumps. Likely to change under flood conditions.	
	right bank	Steep 90° earth unstable bank. Undercut in places, no marginal vegetation.	
Notable channel features	left bank	None - glides and riffles over gravels.	
	right bank	None - glides and riffles over gravels.	
Marginal vegetation (description)	left bank	Limited areas of marginal vegetation due to large areas where the left bank has been re-enforced and the steep bank sides. In the areas adjacent to the confluence with Plants Brook, is an area with colonising marginal vegetation including reed canary-grass, reed sweet-grass, brooklime and branched bur-reed.	
	right bank	None.	
Bank zone habitats (description)	left bank	Mostly re-enforced where it runs alongside Network Rail land with narrow bands of dense scrub and tree lines, dominated by hawthorn scrub, occasional osier (<i>Salix viminalis</i>), guelder rose (<i>Viburnum opulus</i>) and many crack willow trees. The trees have overhanging branches in places and urban flood debris can be seen trapped between them.	
	right bank	Steep and undercut in places. These banks are used by sand martins and kingfisher, but frequently flood, so nesting is unlikely to be successful. Area of dense species-poor, semi-improved grassland and areas of tall ruderal vegetation dominated by stands of creeping thistle occur, including over the adjacent flood bank.	
Adjacent land use	left bank	Network Rail land, beyond which, are the playing fields at Castle Vale.	
	right bank	Park Hall SINC, beyond which is the M6 southbound carriageway.	
Fauna of interest	Kingfisher, sand martins and long tailed tits heard. Diverse range of invertebrates including many bee		

	species, butterflies and the damselfly banded demoiselle. Otter and signal crayfish.
Recreation features	None- Park Hall SINC has no public access.
Existing management	Managed by the Environment Agency and Birmingham and Black Country Wildlife Trust. Whole site is grazed year round by long-horn cattle.
Observed or potential threats to conservation value	Invasive species Japanese knotweed and Indian balsam present.
Suggestions for habitat improvement	Reduction of cattle grazing and management of invasive species along the bank.

Figure 38: RCS hand drawn map for River Tame SLINC- Section 3 (040-RS1-166003)

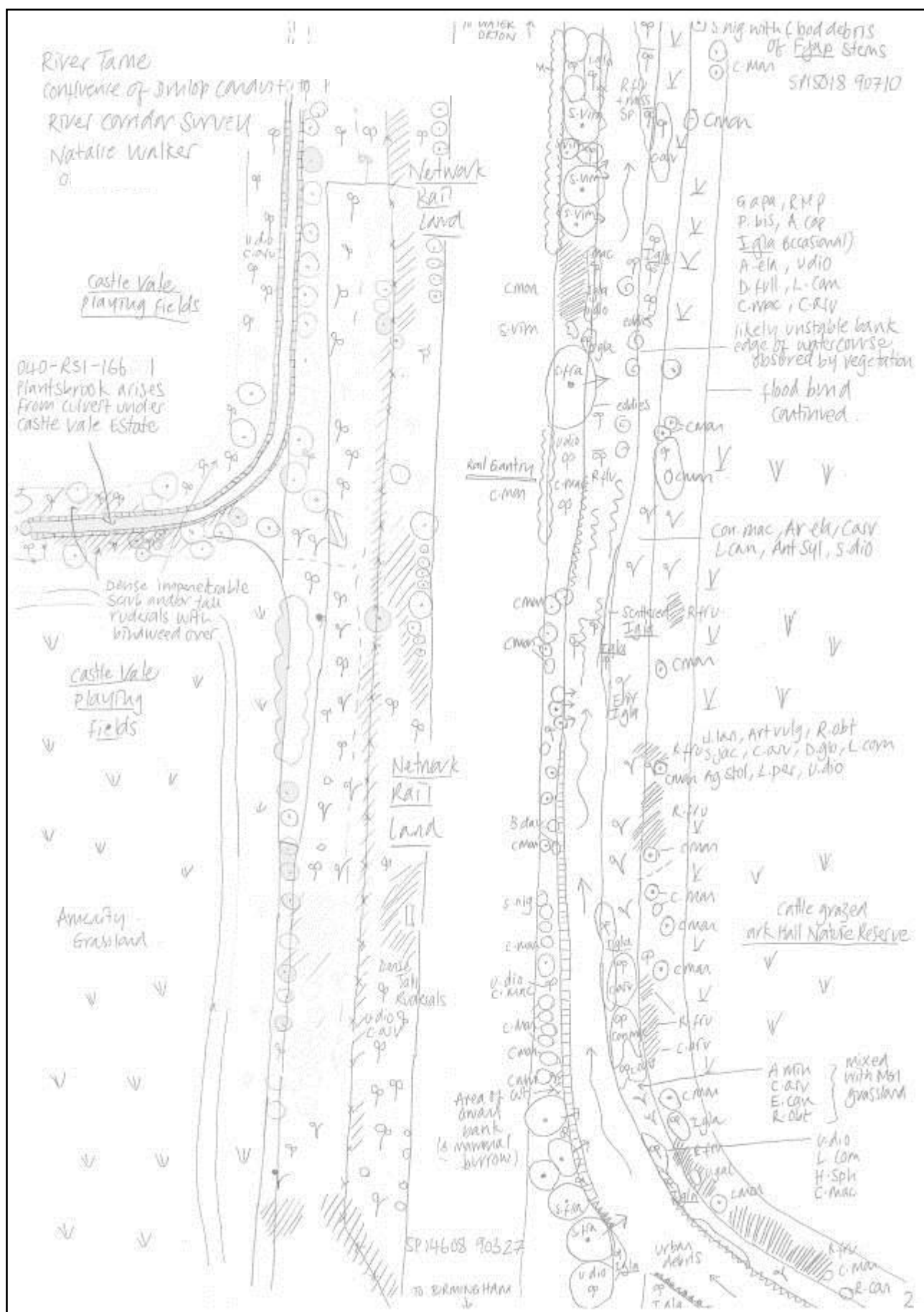


Figure 39: Photograph of River Tame SLINC - Section 3 (CFA25), photo reference 040-RS1-166003-P-260712



Table 54: RCS results for River Tame SLINC - Section 4 (CFA25)

Ecology survey code	040-RS1-166004 - Section 4		
Name of watercourse	River Tame SLINC		
Surveyor(s)	NW; JL	Date	26 July 2012
Survey start	09:30	Survey finish	17:30
Weather conditions	Dry, warm, sunny, west breeze with strong gusts. Moderate water level with rain prior.		
OS Grid Ref (8 digit)	Start Section	SP 14796 90627	
	End Section	SP 14402 90227	
Photo Ref(s)	040-RS1-166004-P-260712		
Average width (m)	9.00		
Average depth (m)	1.00		
Brief description of channel	Wide area of channel, fast flowing and un-shaded. A few areas on left bank have shading from overhanging bankside trees with overhanging vegetation from banks elsewhere. Some areas of riffles and pools upstream and areas of submerged vegetation are dominated by river water-crowfoot with occasional fennel pondweed. The channel has extensive areas of gravels and cobbles, with mud and shallow pools with much urban debris: the areas of debris also trap silts which have been colonised by river water-crowfoot. The channel depth is observed to increase dramatically following heavy rainfall by almost 2m, but also recedes quickly. The channel is mostly steep sided with only a few overflow points.		
Base substrate	Gravels, cobbles and silts.		
Bank type (include height, angle and extent of erosion)	left bank	Bank top is 1-5m above water, with steep vegetated earth cliffs. It has dense areas of tall ruderal vegetation dominated by Indian balsam, wood-sorrel, water chickweed and common nettle.	
	right bank	Steep and man-made (re-enforced) in parts. Some overhanging vegetation.	
Notable channel features	left bank	Areas of riffles and runs leading up to Dunlop Channel.	
	right bank	Areas of riffles and runs leading up to Dunlop Channel.	
Marginal vegetation (description)	left bank	Very few areas of marginal vegetation except for newly colonising growth on areas where bank has slumped, which have a few areas of branched bur-reed, but are typically dominated by Indian balsam.	
	right bank	Areas of urban debris trap silts which have been colonised by river water-crowfoot.	
Bank zone habitats (description)	left bank	Areas upstream of this section have amenity grassland habitat and occasional planted trees. Beyond this is an inaccessible wide area of bank leading up to Dunlop Channel. This bank initially has further areas of semi-mature to young trees beyond which are extensive areas of mono-typical and mixed stands of tall ruderal vegetation typically dominated by Indian balsam or common nettle. Between this are stands of Japanese knotweed.	
	right bank	Areas of species-poor, semi-improved grassland and areas of tall ruderal vegetation dominated by stands of creeping thistle and occasional scattered hawthorn scrub. There is a large pond resulting from an M6 outfall; this spills over the ground in a shallow channel into the River Tame SLINC. This pond is shaded with trees and scrub, including white willow (<i>Salix alba</i>), hawthorn, ash and areas of marginal bulrush. At the outfall	

		point and the overflow channel there is watercress (<i>Nasturtium officinale</i>), brooklime, celery-leaved buttercup (<i>Ranunculus scleratus</i>) and fool's watercress. Beyond this are habitats comprising scattered scrub associated with old hedge lines, open areas of floodplain grassland and small newly created and/or existing ephemeral ponds.
Adjacent land use	left bank	Road leading to business units and the Birmingham City Council recycling facility.
	right bank	Narrow stretch of semi-natural land (with no apparent landowner and therefore unmanaged) which joins Park Hall SINC, beyond which is the M6 southbound carriageway.
Fauna of interest	Kingfisher (flying up and downstream), sand martin, goldfinch, cormorant, blackbird and reed warbler present. Otter and signal crayfish.	
Recreation features	None- no public access.	
Existing management	Managed by the Environment Agency and Birmingham and Black Country Wildlife Trust. Whole site is grazed year round by long-horn cattle.	
Observed or potential threats to conservation value	Invasive species Japanese knotweed and Indian balsam present. Pond outfall has one plant of the invasive species Japanese rose present. At the nearest outfall point at the M6 outfall pond the water has a blue colouration and appears polluted.	
Suggestions for habitat improvement	Reduction in cattle grazing: management of Japanese knotweed, Japanese rose and Indian balsam bioremediation treatment of the water at the outfall pond.	

Figure 40: RCS hand drawn map for River Tame SLINC- Section 4 (040-RS1-166004)

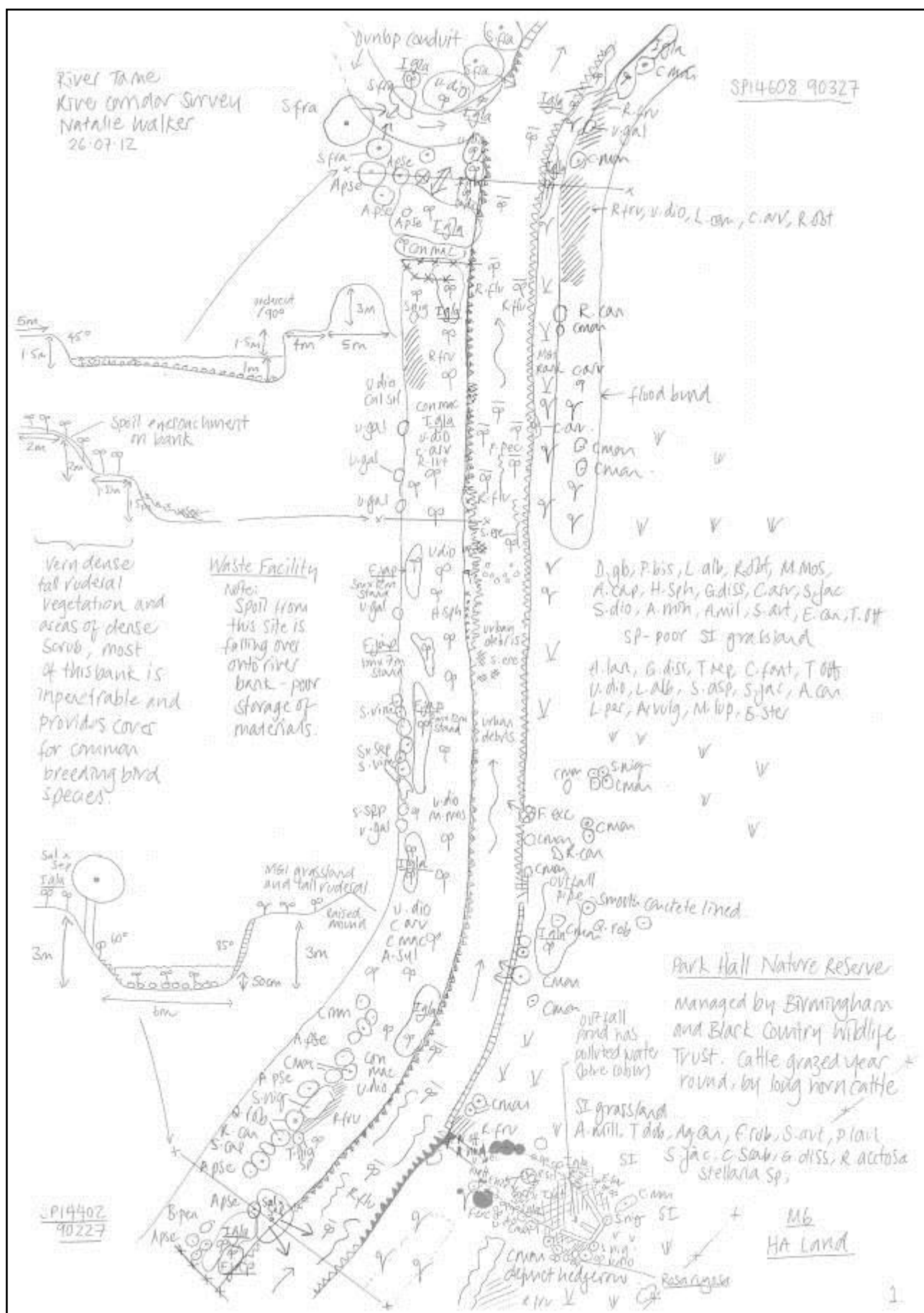


Figure 41: Photograph of River Tame SLINC - Section 4 (CFA25), photo reference 040-RS1-166004-P-260712



Plants Brook within the Castle Bromwich and Bromford area (CFA25)

- 7.4.14 Plants Brook was a small, realigned and deepened watercourse. It had stone/concrete banks and stream-bed, which showed accumulation of gravels and sands over a brick substrate. Some aquatic vegetation was present in the channel at the time of survey as well as on the margins of the watercourse.
- 7.4.15 Plants Brook was surveyed, using RCS, as shown in Table 55 and by the hand drawn figure shown in Figure 42. Photographs of this section of river can be found in Figure 43, Figure 44, Figure 45 and Figure 46.

Table 55: RCS results for Plants Brook (CFA25)

Ecology survey code	040-RS-166005		
Name of watercourse	Plants Brook		
Surveyor(s)	DB; NW; DP	Date	11 June 2013; 06 July 2013
Survey start	13:00	Survey finish	17:30
Weather conditions	Fine, no preceding rain		
OS Grid Ref (8 digit)	Start Section	SP 1516 9084	
	End Section	SP 1487 9089	
Photo Ref(s)	040-RS1-166005-P-110613		
Average width (m)	1.00		
Average depth (m)	0.53		
Brief description of channel	Channel is narrow and shaded, likely to have some silts and gravels over a man-made base and sides (open culvert form). Channel opens out and becomes shallower just prior to the rail bridge, with gravels and natural and man-made silt bars.		
Base substrate	Gravel and silts over likely man-made base.		
Bank type (include height, angle and extent of erosion)	left bank	Steep man-made bank 90°.	
	right bank	Steep man-made bank 90°.	
Notable channel features	left bank	None - slight riffles over gravels at downstream end.	
	right bank	None - slight riffles over gravels at downstream end.	
Marginal vegetation (description)	left bank	Limited areas of marginal vegetation due to extent of man-made banks, narrowness of the channel and over-shading by adjacent trees, scrub and tall ruderal vegetation. In one location at its downstream end is a silt bar with branched bur-reed and Indian balsam. Elsewhere only a few areas of slumped bank or areas where silts have been trapped behind urban debris are colonised but only by Indian balsam.	
	right bank	None - a single apparently man-made silt bar at downstream end with no vegetation, just bare sands.	
Bank zone habitats (description)	left bank	This bank is completely overgrown with dense bramble scrub, occasional scattered hawthorn and elder and tall ruderal vegetation comprising common nettle, hogweed and creeping thistle over which is a dense layer of hedge bindweed. Elsewhere are areas of shading from a row of large poplar trees.	
	right bank	This bank is completely overgrown with dense bramble scrub, occasional scattered hawthorn and elder and tall ruderal vegetation comprising common nettle, hogweed and creeping thistle over which is a dense layer of hedge bindweed.	
Adjacent land use	left bank	Playing fields at Castle Vale.	
	right bank	Playing fields at Castle Vale, then Network Rail owned land.	
Fauna of interest	None observed.		
Recreation features	Adjacent Castle Vale playing fields are used for football, dog walking and general walking. Some antisocial behaviour does occur in this location with evidence of occasional fires set in the hollows of the semi-mature poplar trees.		
Existing	Plants Brook and the Castle Vale playing fields are managed by Birmingham City Council (BCC) and		

management	Network Rail Land is managed by Network Rail.
Observed or potential threats to conservation value	Invasive species Japanese knotweed and Indian balsam present.
Suggestions for habitat improvement	Opening up the brook, providing graduated banks through the removal of the hard engineered banks may be beneficial and assist colonisation by native species. This may also provide increased amenity benefits although access and safety issues (culverts) would need to be assessed. Some scrub removal and treatment / removal of invasive species would also be beneficial.



Figure 43: Photograph of Plants Brook (CFA25), photo reference 040-RS1-166005-P-110613-P1



Figure 44: Photograph of Plants Brook (CFA25), photo reference 040-RS1-166005-P-110613-P2



Figure 45: Photograph of Plants Brook (CFA25), photo reference 040-RS1-166005-P-110613-P3



Figure 46: Photograph of Plants Brook (CFA25), photo reference 040-RS1-166005-P-110613-P4



River Tame SLINC within the Washwood Heath to Curzon Street area (CFA26)

- 7.4.16 In addition to the section that crosses the land required for the construction of the Proposed Scheme in CFA25, there were crossings of the River Tame SLINC in the Washwood Heath to Curzon Street area (CFA26). A single RCS was undertaken as all other sections were either inaccessible, or access was not granted. Given the urban nature of the catchment, the sections not surveyed are considered likely to be similar to those described in the Castle Bromwich and Bromford area (CFA25), and are known to have been re-aligned with stone/concrete banks. Proposed Scheme
- 7.4.17 River Tame SLINC was surveyed, using RCS, as shown in Table 56 and hand drawn survey map is shown in Figure 47. Photographs of the sections of river can be found in Figure 48 and Figure 49.

Table 56: RCS results for River Tame SLINC (CFA25)

Ecology survey code	040-RS1-170001		
Name of watercourse	River Tame SLINC		
Surveyor(s)	DB	Date	12 June 2013
Survey start	Not recorded	Survey finish	Not recorded
Weather conditions	Fine, no preceding rain		
OS Grid Ref (8 digit)	Start Section	SP 1148 8961	
	End Section	SP 1161 8948	
Photo Ref(s)	040-RS1-170001-p-120613-P1, 040-RS1-170001-p-120613-P2		
Average width (m)	Not recorded		
Average depth (m)	Not recorded		
Brief description of channel	Realigned with stone/concrete banks. Natural bed substrate with extensive beds of river water-crowfoot. Substrate cobble and boulder (no access so not inspected in detail).		
Base substrate	Cobble and boulder		
Bank type (include height, angle and extent of erosion)	left bank	High, near vertical concrete banks.	
	right bank	As left bank.	
Notable channel features	left bank	None.	
	right bank	None.	
Marginal vegetation (description)	left bank	None observed.	
	right bank	None observed.	
Bank zone habitats (description)	left bank	Planted trees, local rough grass, bramble and tall herbs.	
	right bank	As left bank	
Adjacent land use	left bank	Industrial.	
	right bank	Industrial.	
Fauna of interest	None observed.		
Recreation features	None.		
Existing management	None.		
Observed or potential threats to conservation value	Urban and industrial runoff and discharges.		
Suggestions for habitat improvement	More natural bank profile.		

Figure 47: RCS hand drawn map for River Tame SLINC (040-RS1-170001)

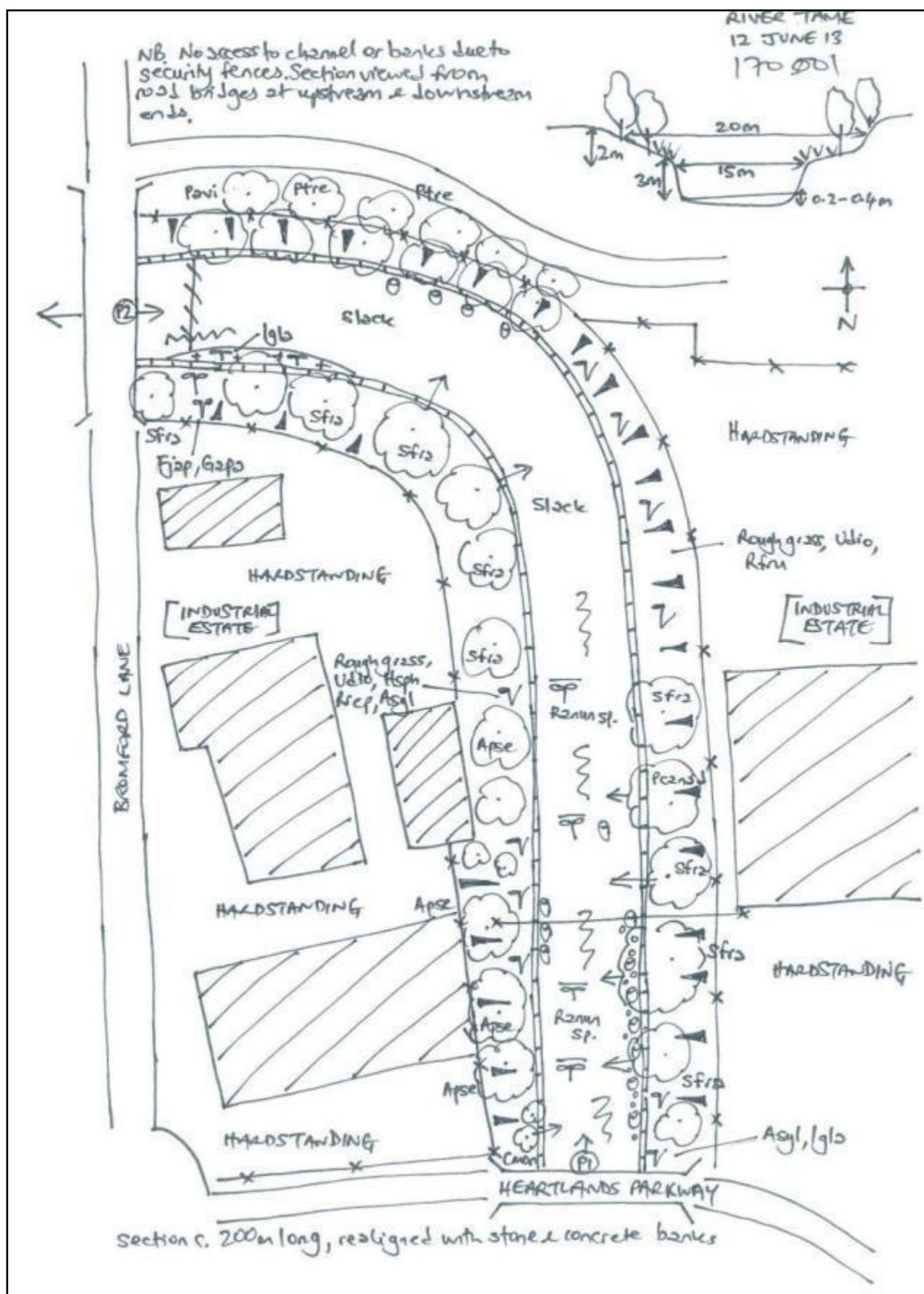


Figure 48: Photograph of River Tame SLINC (CFA25), photo reference 040-RS1-170001-p-120613-P1



Figure 49: Photograph of River Tame SLINC (CFA25), photo reference 040-RS1-170001-p-120613-P2



River Rea within the Washwood Heath to Curzon Street area (CFA26)

- 7.4.18 The River Rea was a moderate sized, heavily altered (re-aligned) watercourse. No aquatic vegetation or marginal vegetation was present at the time of survey.
- 7.4.19 RCS were undertaken on two different sections of the River Rea. The principal results of this survey are shown in Table 57 and Table 58. Hand drawn figures are shown in Figure 50 and Figure 54. Photographs of the sections of river can be found in Figure 51, Figure 52, Figure 53 and Figure 55.

Table 57: RCS results for River Rea - Section 1 (CFA26)

Ecology survey code	040-RS1-173001 - Section 1		
Name of watercourse	River Rea		
Surveyor(s)	DB	Date	13 June 2013
Survey start	Not recorded	Survey finish	Not recorded
Weather conditions	Fine, no preceding rain		
OS Grid Ref (8 digit)	Start Section	SP 0923 8831	
	End Section	SP 0911 8779	
Photo Ref(s)	040-RS1-173001-P-130613-P1, 040-RS1-173001-P-130613-P2, 040-RS1-173001-P-130613-P3		
Average width (m)	10		
Average depth (m)	Less than 0.3		
Brief description of channel	Realigned and deepened. Brick retaining walls and channel bed. No natural bed substrate.		
Base substrate	Brick		
Bank type (include height, angle and extent of erosion)	left bank	3m brick walls	
	right bank	5m brick walls.	
Notable channel features	left bank	None.	
	right bank	None.	
Marginal vegetation (description)	left bank	None observed.	
	right bank	None observed.	
Bank zone habitats (description)	left bank	None.	
	right bank	None.	
Adjacent land use	left bank	Light industrial, plantation, roads.	
	right bank	Plantation, scrub, roads and light industrial.	
Fauna of interest	None observed.		
Recreation features	None.		
Existing management	None		
Observed or potential threats to conservation value	Urban and industrial runoff and discharges.		
Suggestions for habitat improvement	Reinstate more natural channel alignment, banks and substrate.		

Figure 50: RCS hand drawn map for River Rea - Section 1 (040-RS1-173001).

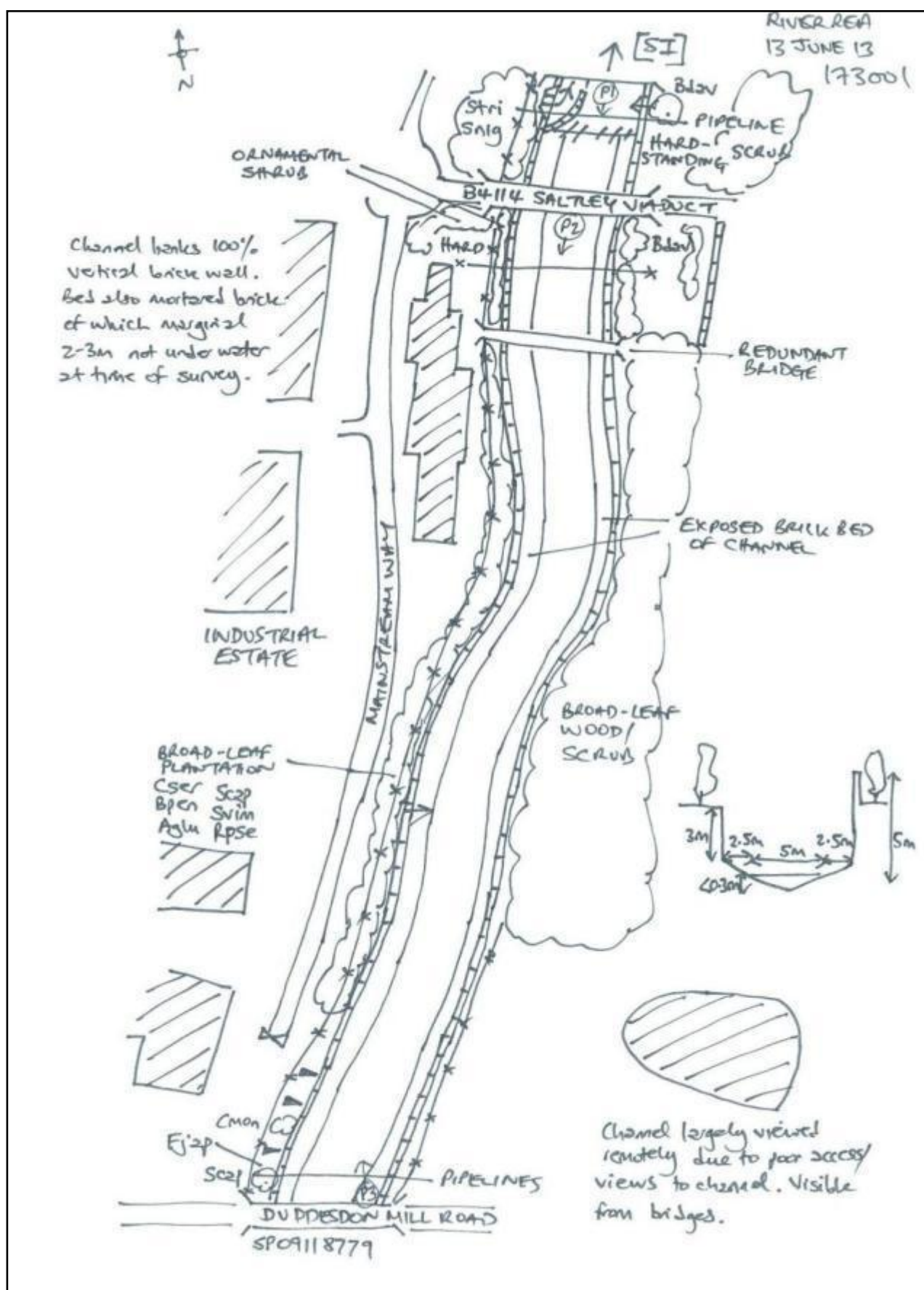


Figure 51: Photograph of River Rea - Section 1 (CFA26), photo reference 040-RS1-173001-P-130613-P1



Figure 52: Photograph of River Rea - Section 1 (CFA26), photo reference 040-RS1-173001-P-130613-P2



Figure 53: Photograph of River Rea - Section 1 (CFA26), photo reference 040-RS1-173001-P-130613-P3



Table 58: RCS results for River Rea - Section 2 (CFA26)

Ecology survey code	040-RS1-174001		
Name of watercourse	River Rea - Section 2		
Surveyor(s)	DB	Date	13 June 2013
Survey start	Not recorded	Survey finish	Not recorded
Weather conditions	Fine, no preceding rain		
OS Grid Ref (8 digit)	Start Section	SP 0911 8779	
	End Section	SP 0860 8731	
Photo Ref(s)	040-RS1-174001-P-130613-P1,		
Average width (m)	10.00		
Average depth (m)	Less than 0.30		
Brief description of channel	Realigned and deepened channel with artificial brick walls and artificial bed.		
Base substrate	Artificial bed (brick)		
Bank type (include height, angle and extent of erosion)	left bank	Vertical brick wall (up to 5m).	
	right bank	Vertical brick wall (up to 5m).	
Notable channel features	left bank	None.	
	right bank	None.	
Marginal vegetation (description)	left bank	None observed.	
	right bank	None observed.	
Bank zone habitats (description)	left bank	None.	
	right bank	None.	
Adjacent land use	left bank	Industrial.	
	right bank	Industrial.	
Fauna of interest	None observed.		
Recreation features	None		
Existing management	None		
Observed or potential threats to conservation value	Urban and industrial runoff and discharges.		
Suggestions for habitat improvement	Reinstate more natural channel alignment, banks and substrate.		

Figure 54: RCS hand drawn map for River Rea - Section 2 (040-RS1-174001)

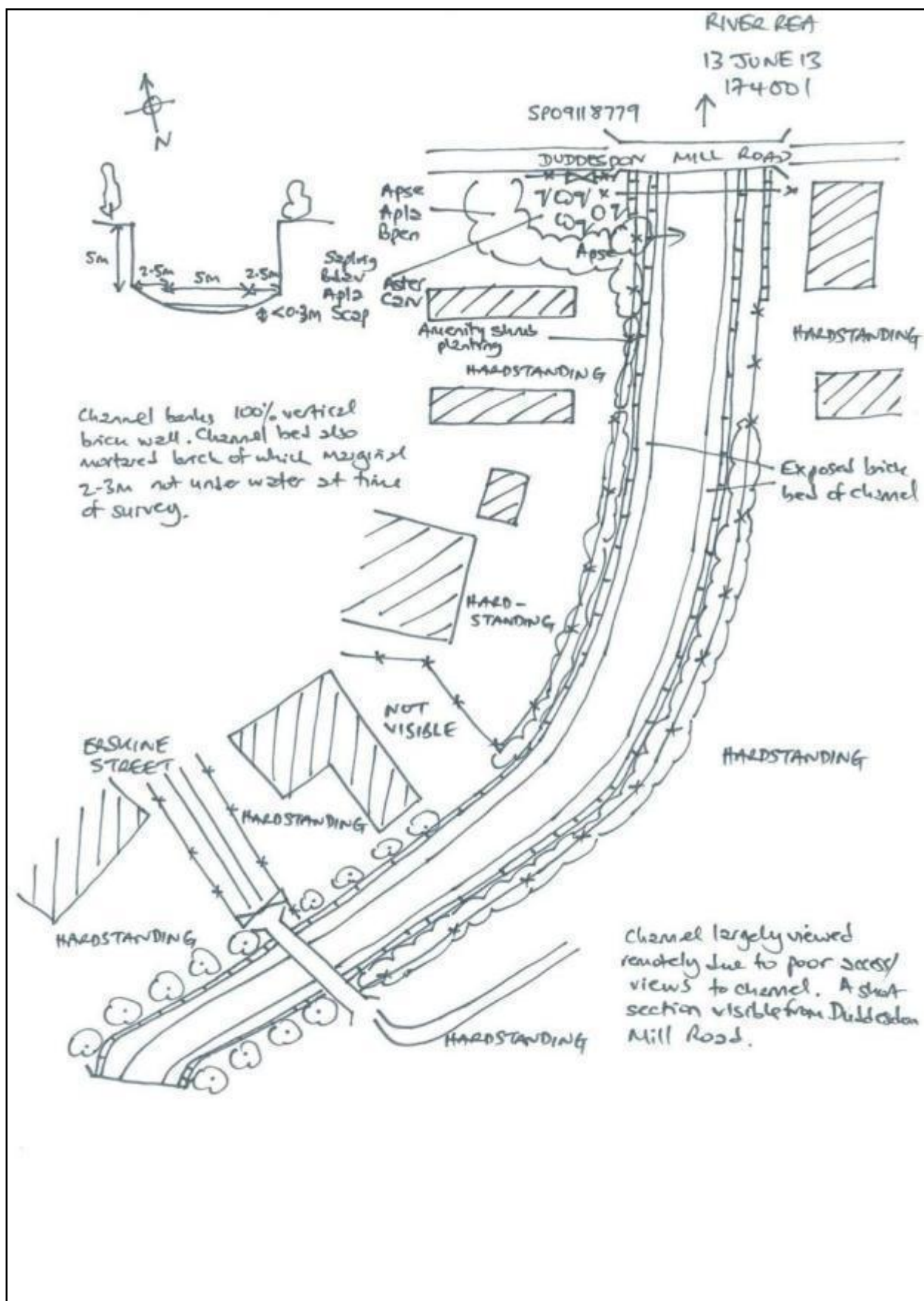


Figure 55: Photograph of River Rea - Section 2 (CFA26), photo reference 040-RS1-174001-P-130613-P1



8 Hedgerow survey

8.1 Introduction

- 8.1.1 This section of the appendix presents details of hedgerow survey and associated desk study information for the section of the Proposed Scheme that will pass through CFA23, CFA24, CFA25 and CFA26.

8.2 Methodology

- 8.2.1 Details of the standard methodology used for hedgerow surveys are provided in the Ecology technical note: Ecological field survey methods and standards (Volume 5: Appendix CT-001-000/2).
- 8.2.2 Desk study data for the Balsall Common and Hampton-in-Arden area (CFA23) and Chelmsley Wood and Birmingham Interchange area (CFA24) was provided by Warwickshire Biological Records Centre.

8.3 Deviations, constraints and limitations

- 8.3.1 All hedgerows within and up to 100m from the land required for the construction of the Proposed Scheme were identified from aerial photography and were then scoped and surveyed in the field. A number of hedgerows were not surveyed due to lack of land access. The likely classification of the hedgerows within these land parcels was based on the composition of hedgerows in neighbouring land parcels and aerial photography and OS mapping showing connection with other hedgerows assessed as important, and is detailed in Table 59.

Table 59: Summary of hedgerows where no access was available for survey in CFA23, CFA24, CFA25 and CFA26

Site name and location	Likely Classification	Distance from land required for the construction of the Proposed Scheme ¹²⁸	CFA
Areas north of Bradnock's Marsh and south of Marsh Farm, located east of A452 Kenilworth Road.	Contains 35 hedgerows that cannot be ruled out as important under the wildlife and landscape criteria of The Hedgerow Regulations 1997 ¹²⁹ due to connection with other hedgerows assessed as important and providing connection between large parcels of woodland.	Within land required	23
Meriden Mill Farm.	Hedgerows within this land parcel cannot be ruled out as 'important' under the wildlife and landscape criteria of The Hedgerows Regulations 1997.	Less than 100m	24
Field south of Coleshill & Bannerly Pools SSSI	Contained two hedgerows which cannot be ruled out as 'important' under the wildlife and landscape criteria of The Hedgerows Regulations 1997.	Within land required	24

¹²⁸The phrase 'Within land required' represents an abbreviation of this term

¹²⁹The National Archives; The Hedgerows Regulations 1997; <http://www.legislation.gov.uk/ukxi/1997/1160/contents/made>; accessed 04 February 2013

8.4 Baseline

- 8.4.1 Hedgerows that are considered to be an 'important hedgerow'¹³⁰ under The Hedgerow Regulations 1997¹³¹ are listed in Table 6o along with the criteria that they meet. These can be viewed in conjunction with Map series EC -10 (Volume 5, Map Book Ecology).

¹³⁰ Hedgerow which meets the necessary criteria defined in The Hedgerow Regulations (1997). Note the current assessment only takes into consideration the wildlife and landscape criteria, as historical value does not form part of the scope of the ecological assessment.

¹³¹ HMSO (1997). The Hedgerow Regulations. SI 1197 No. 1160.

Appendix EC-001-004

Table 6o: Summary of hedgerows qualifying as 'important hedgerows' under wildlife and landscape criteria

Ecology survey code	Centroid OS grid reference	Survey date	Qualifying wildlife and landscape criteria							CFA	Within land required for the construction of the Proposed Scheme (Yes/No)
			(1)	(2)	(3)	(4)	(5)	(6)	(7)		
040-HS1-147003	SP 256 768	21 August 2012	✓			✓			✓	23	Yes
040-HS1-147004	SP 256 767	14 August 2012			✓				✓	23	Yes
040-HS1-147005	SP 254 768	14 August 2012			✓				✓	23	Yes
040-HS1-147006	SP 255 767	14 August 2012			✓		✓		✓	23	Yes
040-HS1-147007	SP 257 770	21 August 2012				✓			✓	23	No
040-HS1-147009	SP 256 770	21 August 2012			✓	✓			✓	23	Yes
040-HS1-148001	SP 256 771	21 August 2012				✓			✓	23	No
040-HS1-148002	SP 253 770	21 August 2012			✓	✓			✓	23	Yes
040-HS1-148006	SP 252 769	14 August 2012	✓		✓	✓			✓	23	Yes
040-HS1-148007	SP 252 770	14 August 2012			✓				✓	23	No
040-HS1-148008	SP 253 771	18 August 2012			✓	✓			✓	23	Yes
040-HS1-148009	SP 254 771	18 August 2012			✓				✓	23	Yes
040-HS1-148012	SP 252 770	14 August 2012				✓			✓	23	Yes
040-HS1-148014	SP 251 770	14 August 2012				✓			✓	23	Yes
040-HS1-148017	SP 249 770	14 August 2012				✓			✓	23	No
040-HS1-148018	SP 249 768	26 July 2012				✓		✓	✓	23	No
040-HS1-148021	SP 252 774	22 August 2012				✓	✓		✓	23	Yes
040-HS1-148024	SP 249 769	14 August 2012				✓	✓		✓	23	No

Ecology survey code	Centroid OS grid reference	Survey date	Qualifying wildlife and landscape criteria							CFA	Within land required for the construction of the Proposed Scheme (Yes/No)
			(1)	(2)	(3)	(4)	(5)	(6)	(7)		
040-HS1-148025	SP 248 771	26 July 2012				✓			✓	23	No
040-HS1-148026	SP 252 774	22 August 2012				✓			✓	23	No
040-HS1-148027	SP 252 775	22 August 2012				✓			✓	23	No
040-HS1-148028	SP 251 774	22 August 2012				✓	✓		✓	23	No
040-HS1-148030	SP 253 770	22 August 2012				✓	✓		✓	23	No
040-HS1-148031	SP 248 771	26 July 2012				✓			✓	23	No
040-HS1-148032	SP 246 773	14 August 2012				✓			✓	23	Yes
040-HS1-148035	SP 250 775	03 April 2013				✓		✓	✓	23	No
040-HS1-148037	SP 247 772	26 July 2012			✓	✓		✓	✓	23	No
040-HS1-148039	SP 248 775	03 April 2013						✓	✓	23	Yes
040-HS1-148041	SP 248 773	26 July 2012				✓			✓	23	Yes
040-HS1-148042	SP 246 773	26 July 2012						✓	✓	23	No
040-HS1-148044	SP 249 775	03 April 2013				✓		✓	✓	23	No
040-HS1-148047	SP 245 774	26 July 2012						✓	✓	23	No
040-HS1-149011	SP 246 777	16 August 2012			✓				✓	23	No
040-HS1-149012	SP 247 778	03 April 2013				✓			✓	23	No
040-HS1-149016	SP 246 776	02 October 2012				✓	✓	✓	✓	23	Yes
040-HS1-149019	SP 246 777	16 August 2012			✓	✓	✓		✓	23	No
040-HS1-149024	SP 245 778	10 August 2012				✓			✓	23	No
040-HS1-149027	SP 244 777	10 July 2012				✓			✓	23	Yes

Ecology survey code	Centroid OS grid reference	Survey date	Qualifying wildlife and landscape criteria							CFA	Within land required for the construction of the Proposed Scheme (Yes/No)
			(1)	(2)	(3)	(4)	(5)	(6)	(7)		
040-HS1-149028	SP 244 779	10 July 2012				✓			✓	23	Yes
040-HS1-149029	SP 242 777	10 July 2012				✓			✓	23	Yes
040-HS1-149030	SP 245 780	09 August 2012			✓	✓			✓	23	No
040-HS1-149032	SP 247 780	09 August 2012			✓	✓			✓	23	No
040-HS1-149033	SP 244 779	10 August 2012			✓	✓	✓		✓	23	Yes
040-HS1-149036	SP 245 780	10 August 2012			✓				✓	23	Yes
040-HS1-149037	SP 243 779	10 July 2012				✓			✓	23	Yes
040-HS1-149039	SP 243 782	05 April 2013			✓	✓			✓	23	Yes
040-HS1-149040	SP 243 779	09 August 2012					✓		✓	23	Yes
040-HS1-149042	SP 243 781	10 July 2012			✓				✓	23	Yes
040-HS1-149046	SP 244 785	05 April 2013				✓			✓	23	No
040-HS1-149048	SP 248 777	05 April 2013			✓				✓	23	No
040-HS1-149049	SP 243 784	05 April 2013			✓				✓	23	No
040-HS1-149052	SP 242 783	05 April 2013			✓	✓			✓	23	Yes
040-HS1-149053	SP 237 779	05 April 2013				✓		✓	✓	23	No
040-HS1-149054	SP 237 779	05 April 2013				✓		✓	✓	23	No
040-HS1-150001	SP 242 786	26 March 2013			✓				✓	23	No
040-HS1-150003	SP 240 784	04 October 2013				✓		✓	✓	23	Yes
040-HS1-150004	SP 241 786	26 March 2013				✓		✓	✓	23	Yes

Ecology survey code	Centroid OS grid reference	Survey date	Qualifying wildlife and landscape criteria							CFA	Within land required for the construction of the Proposed Scheme (Yes/No)
			(1)	(2)	(3)	(4)	(5)	(6)	(7)		
040-HS1-150005	SP 242 783	16 October 2012			✓	✓	✓	✓	✓	23	Yes
040-HS1-150010	SP 242 786	26 March 2013				✓		✓	✓	23	No
040-HS1-150012	SP 242 786	26 March 2013			✓	✓		✓	✓	23	No
040-HS1-150015	SP 238 785	04 October 2013				✓		✓	✓	23	Yes
040-HS1-150016	SP 239 785	16 October 2012				✓			✓	23	Yes
040-HS1-150019	SP 232 784	16 October 2012						✓	✓	23	Yes
040-HS1-150020	SP 232 785	04 October 2013				✓		✓	✓	23	Yes
040-HS1-150021	SP 242 787	31 August 2012			✓			✓	✓	23	Yes
040-HS1-150022	SP 230 784	03 September 2012						✓	✓	23	No
040-HS1-151004	SP 230 786	26 March 2013				✓			✓	23	No
040-HS1-151005	SP 230 789	16 October 2012					✓	✓	✓	23	No
040-HS1-151007	SP 231 791	26 March 2013						✓	✓	23	No
040-HS1-153002	SP 220 807	26 March 2013						✓	✓	23	Yes
040-HS1-153005	SP 217 803	19 September 2012						✓	✓	23	Yes
040-HS1-153015	SP 216 809	12 September 2012						✓	✓	23	Yes
040-HS1-153023	SP 220 811	12 September 2012			✓				✓	23	No
040-HS1-153025	SP 220 813	12 September 2012			✓				✓	23	No
040-HS1-153027	SP 216 809	12 September 2012						✓	✓	23	Yes
040-HS1-153028	SP 217 803	12 September 2012			✓				✓	23	Yes
040-HS1-153036	SP 211 813	12 September 2012						✓	✓	23	No

Ecology survey code	Centroid OS grid reference	Survey date	Qualifying wildlife and landscape criteria							CFA	Within land required for the construction of the Proposed Scheme (Yes/No)
			(1)	(2)	(3)	(4)	(5)	(6)	(7)		
040-HS1-154004	SP 221 817	14 June 2013				✓	✓	✓	✓	23	No
040-HS1-154030	SP 214 817	08 August 2012				✓			✓	23	Yes
040-HS1-154042	SP 211 816	03 July 2012			✓				✓	23	Yes
040-HS1-154046	SP 218 824	14 June 2013					✓		✓	23	No
040-HS1-154050	SP 212 818	08 August 2012						✓	✓	23	Yes
040-HS1-154051	SP 216 821	12 September 2012	✓		✓				✓	23	No
040-HS1-154053	SP 211 817	18 September 2012				✓		✓	✓	23	Yes
040-HS1-154061	SP 211 820	08 August 2012				✓	✓		✓	23	Yes
040-HS1-154062	SP 201 819	07 June 2013			✓				✓	23	No
040-HS1-154063	SP 208 821	07 June 2013			✓				✓	23	Yes
040-HS1-154066	SP 208 819	07 June 2013			✓				✓	23	No
040-HS1-155006	SP 211 824	18 September 2012						✓	✓	23	Yes
040-HS1-155010	SP 211 824	12 September 2012						✓	✓	23	Yes
040-HS1-155013	SP 214 829	18 September 2012						✓	✓	23	Yes
040-HS1-155014	SP 213 810	18 September 2012			✓				✓	23	No
040-HS1-155016	SP 208 824	13 August 2012				✓			✓	23	Yes
040-HS1-155019	SP 208 824	31 August 2012					✓		✓	23	Yes
040-HS1-155020	SP 207 824	31 August 2012				✓			✓	23	No
040-HS1-155022	SP 211 829	18 September 2012				✓	✓		✓	23	Yes

Ecology survey code	Centroid OS grid reference	Survey date	Qualifying wildlife and landscape criteria							CFA	Within land required for the construction of the Proposed Scheme (Yes/No)
			(1)	(2)	(3)	(4)	(5)	(6)	(7)		
040-HS1-155024	SP 207 826	31 August 2012					✓		✓	23	No
040-HS1-155028	SP 206 826	13 August 2012			✓		✓		✓	23	Yes
040-HS1-155030	SP 206 826	31 August 2012				✓			✓	23	No
040-HS1-155033	SP 208 828	12 September 2012				✓			✓	23	Yes
040-HS1-155034	SP 208 828	02 October 2012			✓	✓		✓	✓	23	Yes
040-HS1-155035	SP 206 827	31 August 2012				✓			✓	23	No
040-HS1-155036	SP 206 826	31 August 2012				✓			✓	23	No
040-HS1-155039	SP 207 831	18 September 2012				✓		✓	✓	24	Yes
040-HS1-156002	SP 210 832	10 September 2012						✓	✓	24	Yes
040-HS1-156004	SP 207 831	10 September 2012						✓	✓	24	Yes
040-HS1-156008	SP 205 831	10 September 2012						✓	✓	24	Yes
040-HS1-156012	SP 208 836	10 September 2012					✓	✓	✓	24	Yes
040-HS1-156013	SP 205 833	10 September 2012				✓			✓	24	Yes
040-HS1-156016	SP 205 835	10 September 2012			✓	✓			✓	24	Yes
040-HS1-156020	SP 205 833	10 September 2012			✓				✓	24	Yes
040-HS1-156023	SP 207 837	10 September 2012				✓		✓	✓	24	Yes
040-HS1-156024	SP 203 833	10 September 2012				✓		✓	✓	24	Yes
040-HS1-156029	SP 205 839	10 September 2012	✓			✓			✓	24	Yes
040-HS1-156030	SP 202 837	10 September 2012				✓			✓	24	Yes
040-HS1-156031	SP 206 839	10 September 2012				✓		✓	✓	24	Yes

Appendix EC-001-004

Ecology survey code	Centroid OS grid reference	Survey date	Qualifying wildlife and landscape criteria							CFA	Within land required for the construction of the Proposed Scheme (Yes/No)
			(1)	(2)	(3)	(4)	(5)	(6)	(7)		
040-HS1-156036	SP 202 835	10 September 2012				✓		✓	✓	24	Yes
040-HS1-156038	SP 202 837	10 September 2012			✓	✓		✓	✓	24	Yes
040-HS1-156039	SP 206 842	10 September 2012						✓	✓	24	Yes
040-HS1-157003	SP 202 841	10 September 2012			✓				✓	24	Yes
040-HS1-157004	SP 205 845	10 September 2012			✓				✓	24	Yes
040-HS1-157005	SP 201 845	08 May 2013			✓				✓	24	Yes
040-HS1-158003	SP 201 855	22 May 2013			✓			✓	✓	24	No
040-HS1-158006	SP 194 851	16 October 2012				✓		✓	✓	24	No
040-HS1-158009	SP 194 851	16 October 2012				✓		✓	✓	24	No
040-HS1-158014	SP 195 857	16 October 2012				✓		✓	✓	24	Yes
040-HS1-158015	SP 191 857	16 October 2012			✓	✓		✓	✓	24	No
040-HS1-159002	SP 195 859	27 March 2013				✓			✓	24	Yes
040-HS1-172001	SP 095 888	20 August 2012				✓			✓	26	No
040-HS1-173001	SP 093 880	20 August 2012				✓			✓	26	Yes

Key to wildlife and landscape criteria:

(1) Hedgerow contains species listed on either Part 1 of Schedule 1 of the Wildlife and Countryside Act 1981 (as amended)¹³², Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) or Schedule 8 of the Wildlife and Countryside Act 1981 (as amended); or categorised as either a declining breeder (category 3) in 'Red Data Birds in Britain'¹³³ or 'endangered', 'extinct', 'rare' or 'vulnerable' in Britain in British Red Data Books for vascular plants¹³⁴; insects¹³⁵; and invertebrates other than insects¹³⁶.

¹³² Wildlife and Countryside Act 1981; Ch. 69; HMSO, London

¹³³ Batten LA, Bibby CJ, Clement P, Elliott GD and Porter RF (Eds.) (1990) *Red data birds in Britain*. Nature Conservancy Council and the Royal Society for the Protection of Birds (ISBN 0 85661 056 9)

¹³⁴ Perring FH and Farrell L, 2nd Edition (1983) . *Vascular Plants*. Royal Society for Nature Conservation (ISBN 0 902484 04 4)

Appendix EC-001-004

(2) Hedgerow referred to in a biological desk study record as containing one of the species in (1) within the last five (animals and birds) or ten years (for plants).

(3) Hedgerow contains at least seven woody species/30m.

(4) Hedgerow contains at least six woody species/30m and at least three of the following features identified in Schedule 1 Part II paragraph 7 sub-paragraph 4 of The Hedgerow Regulations 1997, namely (a) a bank or wall which supports the hedgerow along at least one half of its length, (b) gaps which in aggregate do not exceed 10% of the length of the hedgerow, (c) where the length of the hedgerow does not exceed 50m, at least one standard, (d) where the length of the hedgerow exceeds 50 metres but does not exceed 100m, at least 2 standard, (e) where the length of the hedgerow exceeds 100 metres, such number of standard (within any part of its length) as would when averaged over its total length amount to at least one for each 50m, (f) at least three woodland species within 1m, in any direction, of the outermost edges of the hedgerow, (g) a ditch along at least one half of the length of the hedgerow, (h) connections scoring four points or more - connection with another hedgerow scores one point and a connection with a pond or a woodland in which the majority of trees are broad-leaved trees scores two points; and a hedgerow is connected with something not only if it meets it but also if it has a point within 10m of it and would meet it if the line of the hedgerow continued or (i) a parallel hedge within 15m of the hedgerow.

(5) Hedgerow contains at least six woody species/30m, including black-poplar (*Populus nigra* ssp. *betulifolia*), large-leaved lime (*Tilia platyphyllos*), small-leaved lime or wild service-tree (*Sorbus torminalis*).

(6) Hedgerow is adjacent to a bridleway or footpath, a road used as a public path, a byway open to all traffic and includes at least four woody species and a least two of the features specified under (4).

(7) Hedgerow contains at least five woody species/30m and at least four of the features specified under (4).

135 Shirt D B (Ed) (1987) *Insects*. Nature Conservancy Council (ISBN 0 86139 380 5)

136 Bratton JH (Ed.) (1991) *Invertebrates other than insects*. Joint Nature Conservation Committee (ISBN 1 873701 00 4)

Balsall Common and Hampton-in-Arden area (CFA23)

- 8.4.2 Within the Balsall Common and Hampton-in-Arden area (CFA23), 448 hedgerows were identified for survey. Of these hedgerows, 62 were not surveyed due to land access constraints.
- 8.4.3 Of the 386 hedgerows surveyed:
- 104 were 'important' under the wildlife and landscape criteria of The Hedgerows Regulations 1997;
 - 162 were of 'conservation priority' (as having a Hedgerow Evaluation and Grading System (HEGS¹³⁷) score of -2 (moderately high value) or better);
 - 13 contained notable woody species (listed in Schedule 3 of The Hedgerows Regulations 1997) including large-leaved lime, small-leaved lime (*Tilia cordata*) and black poplar;
 - 111 had associated notable ground flora (listed in Schedule 2 of The Hedgerows Regulations 1997);
 - three had evidence of use by badger (*Meles meles*), a legally protected species;
 - one was used by barn owl (*Tyto alba*), a WCA Schedule 1 species; and
 - one had a record of orange foxtail (*Alopecurus aequalis*) within the ground flora (SP21581 82004), although this could not be confirmed during the field survey.
- 8.4.4 Records of notable flora within 250m of the land required for the construction of the Proposed Scheme include:
- 040-HR-154101 which contained black poplar (SP200827 2008). This hedgerow was identified during survey and lies within 100m of the land required for the construction of the Proposed Scheme; and
 - 040-HR-155041 which contained black poplar (SP214829 2009). This hedgerow was identified during survey and lies within 100m of the land required for the construction of the Proposed Scheme.
- 8.4.5 The important hedgerows are described here:
- 040-HS1-147003 was 1-2m wide and 2-4m high. It was a species-rich hedgerow with three mature oak trees and seven young trees (oak and field maple), good connectivity and a dry ditch. Hedgerow species included hawthorn, blackthorn, oak and small-leaved lime;
 - 040-HS1-147004 was 2-3m wide and over 4m high. It was a species-rich hedgerow with one mature oak tree, two semi-mature hazels and one semi-mature ash tree, good connectivity and a wet ditch. Blackthorn was the dominant hedgerow species with hawthorn occurring frequently and

¹³⁷ Clements D. and Toft R. (1992), Hedgerow Evaluation and Grading System (HEGS) A methodology for the ecological survey, evaluation and grading of hedgerows, Countryside Planning and Management, Cirencester (United Kingdom)

occasional hazel, rose, ash, field maple and ivy;

- 040-HS1-147005 was 3m wide and 2-4m in height. It was a species-rich hedgerow with three mature oak trees, a wet ditch and a mixture of hedgerow species including blackthorn, hawthorn, elder, rose, hazel, willow, field maple, bittersweet and sycamore;
- 040-HS1-147006 was 1-2m wide and 2-4m high. It was a species-rich hedgerow with two mature oak trees, good connectivity, a small hedge bank and ditch and a mixture of hedgerow species including hawthorn, blackthorn, elder, hazel, rose, field maple, ash and small-leaved lime. Notable ground flora included false brome, herb robert (*Geranium robertianum*) and male fern;
- 040-HS1-047007 was 2-3m wide and 2-4m high. It was a moderately species diverse hedgerow with one mature oak tree, good connectivity and a small bank. Hawthorn was the dominant hedgerow species with blackthorn occurring frequently and hazel, bullace and elder occurring occasionally to rarely;
- 040-HS1-147009 was 2-3m wide and 2-4m high. It was a species-rich hedge with four young trees (field maple and oak), a moderate hedge bank and ditch. The hedgerow canopy was dominated by blackthorn but had a good mix of other species occurring occasionally including hawthorn, hazel, rose, willow, cherry and bramble. Notable ground flora included barren strawberry (*Potentilla sterilis*), violet and lords-and-ladies (*Arum maculatum*);
- 040-HS1-148001 was 2-3m wide and 2-4m high. It was a species-rich hedgerow with three young trees (field maple and willow), a ditch, hedge bank and a mixture of hedgerow species including hawthorn as the dominant species with frequent blackthorn, locally abundant elder, occasional holly and rarely occurring hazel, along with bittersweet;
- 040-HS1-148002 was 2-3m wide and over 4m high. It was a species-rich hedgerow with two mature oak trees and one mature ash tree, a dry ditch, good connectivity and hedgerow species including hawthorn, blackthorn, oak, rose, hazel, holly and bramble;
- 040-HS1-148006 was 1-2m wide and 2-4m high. It was a species-rich hedgerow with six mature oak trees, a hedge bank and a wet ditch. Blackthorn and hawthorn are frequent to abundant within the hedgerow, along with occasional hazel, rose and elder and rarely occurring field maple, holly and oak. Barren strawberry was notable as ground flora. A barn owl was seen using the hedgerow as a resting place;
- 040-HS1-148007 was 2-3m wide and 2-4m high. It was a species-rich hedgerow without trees, with a wet ditch. Hawthorn and blackthorn occurred frequently along with occasional field maple, hazel, crab-apple, rose, elder and honeysuckle;
- 040-HS1-148008 was 2-3m wide and over 4m high. It was a species-rich hedgerow with a mature field maple, a mature crab-apple, two young trees

(field maple and hawthorn) and a ditch. Hedgerow species included abundant blackthorn, frequent hawthorn and occasional elder, rose, bramble and bittersweet;

- 040-HS1-148009 was over 3m wide and over 4m high. It was a species-rich hedgerow with one mature oak tree, a vegetated wet ditch and a mixture of hedgerow species including hawthorn, blackthorn, rose, elder, hazel, wych elm and cherry. Notable ground flora included dog's mercury and herb robert;
- 040-HS1-148012 was 1-2m wide and over 4m high. It was a species-rich hedgerow with three mature trees (ash and oak) and eight young trees (hawthorn, elm, field maple). The hedgerow had a vegetated wet ditch, a hedge bank and a mixture of hedgerow species including blackthorn, hawthorn, rose, elm, field maple, oak and bramble. Notable ground flora included dog's mercury and herb robert;
- 040-HS1-148014 was 1-2m wide and 2-4m high. It had moderate species diversity with two mature oak trees, a hedge bank, a vegetated wet ditch and moderate connectivity. Blackthorn and hawthorn were the dominant hedgerow species, with occasional to rare hazel, elder and rose;
- 040-HS1-148017 was 1-2m wide and 2-4m high. It was a species-rich hedgerow with two mature oak trees and one mature alder tree, a vegetated wet ditch and a mixture of hedgerow species including hawthorn, blackthorn, willow, holly, alder, ash and elder. Notable ground flora included herb robert;
- 040-HS1-148018 was 2-3m wide and 2-4m high. It was a species poor hedge with one mature ash standard, good connectivity and a wet ditch border on one side. The hedge canopy was dominated by blackthorn with occasional hazel. No notable ground flora was recorded. The hedge was very old, cut/trimmed and adjacent to a Public Right of Way (PRoW);
- 040-HS1-148021 was 1-2m wide and over 4m high. It was a species-rich hedgerow with two mature ash trees and nine young trees including field maple, rowan, oak and sweet chestnut. The hedgerow canopy species included a mixture of hawthorn, hazel, rose, field maple, elder and bullace. Notable ground flora included lords-and-ladies, barren strawberry and bittersweet;
- 040-HS1-148024 was 2-3m wide and 2-4m high. It was a hedgerow with moderate species diversity and four mature trees including oak and field maple. Hawthorn was the dominant hedgerow canopy species, blackthorn was locally abundant and there was occasional elder, holly and hazel. There was a small hedge bank and a dry ditch;
- 040-HS1-148025 was 1-2m wide and 2-4m high. It was a moderately species diverse hedgerow with nine mature trees and two young trees including oak, ash and field maple. The hedgerow had a hedge bank, a dry ditch and good connectivity. The hedgerow canopy was dominated by hawthorn, with frequent blackthorn and occasional hazel and holly;

- 040-HS1-148026 was 0-1m wide and 1-2m high. It was a hedgerow with moderate species diversity and two mature ash, a semi-mature ash and a semi-mature wych elm. The hedgerow canopy consisted of wych elm, hawthorn, elder, ivy and holly and there was a large hedge bank. Notable ground flora included wood avens;
- 040-HS1-148027 was 2-3m wide and over 4m high. It was a species poor hedgerow with one mature oak tree and hawthorn as the dominant hedgerow canopy species, along with rare Leyland cypress. The hedgerow had a small hedge bank and notable ground flora included herb robert, lords-and-ladies, dog's mercury, wood avens, violet, barren strawberry and bittersweet;
- 040-HS1-148028 was 0-1m wide and over 4m high. It was a species-rich hedgerow with a mature oak tree, two young small-leaved lime trees and a mixture of hedgerow canopy species including hawthorn, holly, elder, English elm, hazel, oak and ivy. The hedgerow had a small hedge bank and notable ground flora included dog's mercury, lords-and-ladies, herb robert and bittersweet;
- 040-HS1-148030 was 2-3m wide and over 4m high. It was a species-rich hedgerow with two mature oak trees and one mature ash tree, a dry ditch, good connectivity and hedgerow species include e hawthorn, blackthorn, oak, rose, hazel, holly and bramble;
- 040-HS1-148031 was 2-3m wide and 2-4m high. It was a hedgerow with moderate species diversity, with four mature trees including oak and field maple. Hawthorn was the dominant hedgerow canopy species, blackthorn was locally abundant and there was occasional elder, holly and hazel. There was a small hedge bank and a dry ditch;
- 040-HS1-148032 was 2-3m wide and 2-4m high. The hedgerow had moderate species diversity and contained a mature ash and a mature alder tree. A wet ditch ran alongside it. The hedgerow canopy supported abundant blackthorn, frequent hawthorn and occasional elder. The hedgerow had good connectivity and notable ground flora included dog's mercury, herb robert and wood avens;
- 040-HS1-148035 was 2-3m wide and 1-2m high. It was a species poor hedge with one mature holly standard. The hedge canopy was dominated by hawthorn with frequent ash and ivy and occasional holly. The hedge had moderate connectivity. Lords-and-ladies and dog's mercury were present as notable ground flora. The hedge was cut/trimmed, a fence ran for over half its length and a parallel hedge ran within 15m and adjacent to a track/road;
- 040-HS1-148037 was 1-2m wide and 1-2m high. It was a species-rich hedgerow with three mature trees including field maple, oak and ash. Blackthorn was the dominant hedgerow canopy species, hawthorn was abundant, hazel and elder were occasional and rose was rare. There was a small hedge bank, a dry ditch and notable ground flora including wood sorrel (*Oxalis sp.*). The hedge was adjacent to a PRow;

- 040-HS1-148039 was 1-2m wide and 1-2m high. It was a hedge with moderate species diversity with one mature ash standard and good connectivity. The hedge canopy was dominated by hawthorn with locally dominant holly, frequent ivy and bramble and rare field maple. Bluebell and dog's mercury were present as notable ground flora. The hedge was cut/trimmed and a parallel hedge ran within 15m and adjacent to a track/road;
- 040-HS1-148041 was 1-2m wide and 2-4m high. It was a hedgerow with moderate species diversity, without trees, with a wet ditch. The hedgerow canopy included occasional blackthorn, hawthorn, holly, elm and rare crab-apple. Notable ground flora included bittersweet and wood sorrel;
- 040-HS1-148042 was 1-2m wide and 2-4m high. It was a hedgerow with moderate species diversity, with a mature oak and a mature field maple. The hedgerow canopy consisted of frequent hawthorn, along with occasional hazel, field maple, holly and ivy. There was a small hedge bank and a dry ditch. The hedge was adjacent to a PRoW;
- 040-HS1-148044 was 1-2m wide and 1-2m high. It was a species-rich hedge with one mature oak standard and moderate connectivity. The hedge canopy was mixed frequent ivy, hawthorn, English elm, field maple, blackthorn and hazel with occasional holly and rose. Lords-and-ladies and dog's mercury were present as notable ground flora. The hedge was cut/trimmed with a fence running half its length and adjacent to a track/road;
- 040-HS1-148047 was 1-2m wide and 2-4m high. It was a hedgerow of moderate species diversity, with a mature oak tree and a mature ash tree. Blackthorn was the dominant hedgerow canopy species along with occasional hawthorn and hazel. There was a small hedge bank and a wet ditch. The hedge was adjacent to a PRoW;
- 040-HS1-149011 was 2-3m wide and over 4m high. It was a species-rich hedgerow with mature oak and ash standards and a mixed canopy consisting of native species including blackthorn, hawthorn, elder, hazel, holly, ash and beech along with sycamore and ivy. There was a hedge bank and a dry ditch to one side. Wood dock (*Rumex sanguineus*) was notable as ground flora;
- 040-HS1-149012 was 2-3m wide and 1-2m high. It was a hedgerow of moderate species diversity, with one mature hawthorn and one mature oak standard. The hedge had moderate connectivity. The hedge canopy was dominated by yew with frequent cultivar privet (*Ligustrum sp.*), ivy and bramble, occasional holly and elder and rare hazel and ash. A fence ran half the hedgerows length;
- 040-HS1-149016 was 1-2m wide and 2-4m high. It was a hedgerow of moderate species diversity, with one mature small-leaved lime, one mature and two semi-mature ash, one mature oak, and three semi-mature alder standards. The hedge canopy was mixed hawthorn and elm with frequent holly and occasional elder. A fence ran over half its length and the hedge was cut/trimmed and located adjacent to a track/road;

- 040-HS1-149019 was 2-3m wide and 2-4m high. It was a species-rich hedgerow with mature standards including black poplar, oak, sycamore and small-leaved lime and a mixture of native hedge canopy species including blackthorn, field maple, hawthorn, rose, ash, elder, yew, holly, hazel, elm and oak along with bramble and sycamore. There was a hedge bank and notable ground flora included bittersweet, wood dock and wood avens;
- 040-HS1-149024 was 1-2m wide and 1-2m high. It was a species-rich hedgerow with eight mature trees (oak, ash) and three young trees (large-leaved lime, field maple). Hawthorn was the dominant hedgerow species along with frequent blackthorn and occasional wych elm, English elm and ivy. There was a dry ditch along the hedgerow and notable ground flora included herb robert, bittersweet and lords-and-ladies;
- 040-HS1-149027 was 2-3m wide and 2-4m high. It was a hedgerow of moderate species diversity with two mature ash trees, a wet ditch and a hedge canopy consisting of frequent hawthorn and blackthorn with occasional ash and elder and rarely occurring holly and rose. Notable ground flora included herb robert, wood avens, bittersweet and male fern;
- 040-HS1-149028 was 2-3m wide and over 4m high. It was a species-rich hedgerow with a mature ash tree, a mature oak tree and a young oak tree, a vegetated wet ditch and notable ground flora including dog's mercury, herb robert, bittersweet and wood avens. The hedgerow included frequent hawthorn and occasional alder, blackthorn, elm and willow;
- 040-HS1-149029 was 3m wide and over 4m high. It was a species-rich hedgerow with five mature trees and two young trees (all oak and ash), a vegetated wet ditch, moderate to poor connectivity and a large hedge bank. Blackthorn was abundant throughout the hedge and occurred alongside frequent hawthorn and occasional to rare occurring hazel, oak, rose and elder. Notable ground flora included male fern, bittersweet and herb robert;
- 040-HS1-149030 was 2-3m wide and 2-4m high. It was a species-rich hedgerow with three mature trees (oak and ash), a vegetated wet ditch, good connectivity and hedgerow species including sycamore, hazel, blackthorn, hawthorn, elder, oak and, in parts, holly and field maple. There was a parallel hedge within 15m;
- 040-HS1-149032 was 2-3m wide and 2-4m high. It was a species-rich hedgerow with two mature oak trees, one young ash tree, a hedge bank and a mixture of hedgerow species including abundant hawthorn and blackthorn along with elm, ash, hazel, rose, damson, oak, field maple, bramble and honeysuckle. There was a parallel hedge within 15m;
- 040-HS1-149033 was 1-2m wide and over 4m high. It was a species-rich hedgerow with eight mature trees (oak, ash) and three young trees (large-leaved lime, field maple). Hawthorn was the dominant hedgerow species along with frequent blackthorn and occasional wych elm, English elm and ivy. There was a dry ditch along the hedgerow and notable ground flora included herb

robert, bittersweet and lords-and-ladies;

- 040-HS1-149036 was 1-2m wide and 2-4m high. It was a species-rich hedgerow with two mature trees (field maple and hazel), a dry ditch and a hedge canopy with hawthorn as the dominant species along with hazel, willow, elder, rose, crab-apple, bramble and bittersweet;
- 040-HS1-149037 was 3m wide and over 4m high. It was a hedgerow with moderate species diversity with two mature oaks and one mature ash, a wet ditch, and hedgerow species including hawthorn, blackthorn, ash, oak, willow and elm. Notable ground flora included herb robert, lords-and-ladies and wood avens;
- 040-HS1-149039 was 1-2m wide and 1-2m high. It was a hedgerow of moderate species diversity with one mature oak standard and poor connectivity. The hedge canopy was dominated by hawthorn with frequent hazel, blackthorn and dog rose, along with occasional ash, elder and rose. Lords-and-ladies, bluebell, primrose (*Primula vulgaris*) and ramsons were present as notable ground flora. A wet ditch bordered one side and the hedge was cut/ trimmed;
- 040-HS1-149040 was 1-2m wide and 2-4m high. It was a species-rich hedgerow with one mature ash tree and four young trees (large-leaved lime, willow and hawthorn), good connectivity, a dry ditch and a mixture of hedgerow species including hawthorn, hazel, elder and bramble;
- 040-HS1-149042 was 3m wide and over 4m high. It was a hedgerow of moderate species diversity, with five mature ash trees and one young alder tree and a vegetated wet ditch. The hedge canopy species mix included hawthorn, blackthorn, willow, alder and elder. Notable ground flora included wood avens;
- 040-HS1-149046 was 1-2m wide and 1-2m high. It was a hedge with moderate to poor species diversity, with no standards and moderate to good connectivity (pond at west) with a wet ditch bordering one side. The hedge canopy was dominated by hawthorn with frequent hazel, ivy and bramble and occasional blackthorn. Lords-and-ladies, primrose and ramsons were present as notable ground flora. The hedge was cut / trimmed;
- 040-HS1-149048 was 1-2m wide and 1-2m high. It was a species poor hedge with one mature ash standard. The hedge canopy was hawthorn dominated with frequent holly and occasional elder. Lords-and-ladies and bluebell were present as notable flora. The hedge was cut/trimmed;
- 040-HS1-149049 was 1-2m wide and 1-2m high. It was a species-rich hedge with one semi-mature alder standard and good connectivity. The hedge canopy was dominated by hawthorn with abundant elm and rose, frequent hazel, occasional blackthorn and rarely occurring field maple and holly, bluebell, lords-and-ladies and ramsons were present as notable ground flora. The hedge was cut / trimmed;

- 040-HS1-149052 was 1-2m wide and 1-2m high. It was a hedgerow of moderate species diversity with one mature oak and one mature beech standard, moderate to good connectivity and a wet ditch bordering one side. The hedge canopy was dominated by hawthorn with frequent blackthorn, elm, rose and hazel, along with occasional ivy and bramble. Lords-and-ladies, wood avens, bluebell and ramsons were present as notable ground flora;
- 040-HS1-149053 was 1-2m wide and 2-4m high. It was a hedgerow of moderate species diversity with five mature oak standards. The hedge canopy was dominated by hawthorn with frequent to locally dominant hazel, frequent ivy and bramble along with occasional elm, rose and holly. Bluebell was present as notable ground flora. The hedge was unmanaged, fence 1.2m in length, adjacent to track / road and adjacent to PRoW / footpath. The hedge merged into plantation woodland, dominated by silver birch;
- 040-HS1-149054 was 1-2m wide and 2-4m high. It was a hedgerow of moderate species diversity, with six mature oak standards. The hedge canopy was dominated by hawthorn with frequent hazel and holly, occasional elm, rose, bramble and ivy. The hedge was unmanaged, adjacent to a track/road and a fence runs less than half its length. Bluebell and primrose were present as notable ground flora. The hedge merged into plantation woodland;
- 040-HS1-150001 was 2-3m wide and 1-2m high. It was a species-rich hedge with one semi-mature ash, one semi-mature hazel and one semi-mature hawthorn standard, good connectivity and a dry ditch to one side. The hedge canopy was dominated by hawthorn with locally abundant holly, frequent elder and ash and occasionally occurring bramble, ivy and rose. Lords-and-ladies was present as notable ground flora. The hedge was cut/trimmed;
- 040-HS1-150003 was 1-2m wide and 1-2m high. It was a hedgerow of moderate species diversity with two mature ash and one mature oak standard, moderate connectivity with a dry ditch bordering one side and a grass verge on one side. The hedge canopy was dominated by hawthorn with locally dominant hazel, occasional elder and holly and rare ash. No notable ground flora was present. The hedge was cut/trimmed, adjacent to a track/road and a parallel hedge ran within 15m;
- 040-HS1-150004 was 1-2m wide and 1-2m high. It was a species-rich hedge with one mature ash and four mature oak standards, good connectivity and a grass verge greater than 2m to one side. The hedge canopy was mixed abundant hawthorn and ash with frequent hazel, locally abundant blackthorn, occasionally occurring rose and ivy and rarely occurring elder and bramble. The hedge was cut/trimmed and ran parallel to a hedge within 15m, adjacent to a track/road and adjacent to a PRoW;
- 040-HS1-150005 was 1-2m wide and 1-2m high. It was a species-rich hedge with five mature ash and two mature oak, one semi-mature field maple and one semi-mature lime standard. The hedge canopy was mixed hawthorn and blackthorn with frequent elder and hazel, occasional lime, field maple and dog-

rose. A 2m wide grass verge was present on one side, unmanaged and adjacent to a track/road;

- 040-HS1-150010 was 1-2m wide and 1-2m high. It was a hedgerow of moderate species diversity with one mature beech and one mature oak standard, high connectivity and with a wet ditch and hedge bank to 0.5m border one side. The hedge canopy was mixed abundant hawthorn with occasionally occurring ash, beech, elder, blackthorn and hazel. Lords-and-ladies and bluebell were present as notable ground flora. The hedge was cut/trimmed, adjacent to a track/road and fence ran along more than half the length of the hedgerow;
- 040-HS1-150012 was 1-2m wide and 1-2m high. It was a hedgerow of moderate species diversity with one mature ash, four mature oak and three semi-mature hawthorn standards, good connectivity and a grass verge greater than 2m to one side. The hedge canopy was dominated by hawthorn with frequent blackthorn and occasionally occurring ash, hazel and elder. Lords-and-ladies was present as notable ground flora. The hedge was cut/trimmed, adjacent to a track/toad and a parallel hedge ran within 15m;
- 040-HS1-150015 was 1-2m wide and 1-2m high. It was a hedgerow of moderate species diversity with three mature and one semi-mature oak standard, a moderate connectivity and with a ditch and grass verge bordering one side. The hedge canopy was dominated by hawthorn with locally abundant blackthorn, occasional hazel and elm and rarely occurring ash and sycamore. The hedge was cut/trimmed, fence ran along more than half its length, adjacent to a track/road and a parallel hedge within 15m;
- 040-HS1-150016 was 2-3m wide and 2-4m high. It was a hedgerow of moderate species diversity with three mature oak, one mature ash, one mature holly and one semi-mature hawthorn standard, moderate connectivity and a wet ditch bordering one side. The hedge canopy was dominated by hazel with frequent elder and hawthorn and occasionally occurring blackthorn and bramble. The hedge was unmanaged and a fence ran over half its length;
- 040-HS1-150019 was 2-3m wide and 1-2m high. It was a hedgerow of moderate species diversity with two mature alder, one mature hawthorn and one young field maple standard. A grass verge greater than 2m was present on one side, a fence ran over half its length, the hedge was cut/trimmed and was adjacent to a track/road and PRow;
- 040-HS1-150020 was 1-2m wide and 1-2m high. It was a hedgerow of moderate species diversity, with one mature and one semi-mature ash, one mature oak and one semi-mature willow standard, moderate connectivity and a dry ditch bordering one side. The hedge canopy was dominated by blackthorn with frequent hawthorn, occasional hazel and occasional oak. No notable ground flora was present. The hedge was cut/trimmed, adjacent to a track/road and ran parallel to another hedge found within 15m;
- 040-HS1-150021 was 100m long, 1-2m wide and 1-2m high. It was a hedgerow

of moderate species diversity, with one mature oak standard and good connectivity. The hedge canopy was mixed abundant blackthorn, frequent elder and occasionally occurring hazel, holly and hawthorn. Bluebell was present as notable ground flora. The hedge was cut/trimmed;

- 040-HS1-150022 was 2-3m wide, 2-4m high. It was a hedgerow of moderate species diversity with two mature ash trees, good connectivity, a wet vegetated ditch and a mixed hedgerow canopy including hawthorn, field maple, elder, hazel, rose and bramble. The hedgerow was adjacent to a track/road and there was a parallel hedgerow within 15m;
- 040-HS1-151004 was 2-3m wide and 1-2m high. It was a species-rich hedge with four mature oak and three mature sycamore standards, good connectivity and a hedge bank to 0.5m and a wet ditch to one side. The hedge canopy was dominated by hawthorn with abundant field maple, elder and ivy, occasional bramble and honeysuckle and rarely occurring oak and sycamore. Bluebell was present as notable ground flora, the hedge was old, it was cut/trimmed and a fence ran over half its length;
- 040-HS1-151005 was 1-2m wide and 1-2m high. It was a hedgerow of moderate species diversity with one mature small-leaved lime, one mature oak, two mature cherry, one mature ash and one semi-mature field maple standard. A grass verge greater than 2m on one side, a fence ran over half its length, the hedge was cut/trimmed and was adjacent to track/road;
- 040-HS1-151007 was 1-2m wide and 1-2m high. It was a hedgerow of moderate species diversity with no standards but good connectivity. The hedge canopy was mixed hawthorn, field maple and elder with frequent rose, ivy and bramble. Bluebell was present as notable ground flora. The hedge was cut/trimmed and a fence ran over half its length and adjacent to a PROW;
- 040-HS1-153002 was 2-3m wide and 2-4m high. It was a hedgerow of moderate species diversity with no standards (NB. Trees on A452 Kenilworth Road verge within 5m), moderate connectivity and a dry ditch on one side. The hedge canopy was dominated by hawthorn with frequent elder and alder and occasionally occurring silver birch, field maple and hazel, gorse (*Ulex sp.*) was frequent throughout. No notable ground flora was present. The hedge was unmanaged and a fence ran over half way along its length. The hedge was adjacent to a track/road;
- 040-HS1-153005 was 2-3m wide and over 4m high. It was a species-rich hedgerow with mature trees including oak, hazel, sycamore and holly and young trees including yew, rowan and hazel. The hedgerow had a hedge bank and was adjacent to a footpath and track, had a parallel hedgerow within 15m and had a hedgerow canopy dominated by hawthorn, with frequent bramble and occasional blackthorn, willow, holly and field maple;
- 040-HS1-153015 was 1-2m wide and over 4m high. It was becoming a tree line with willow pollards and mature oak, elder, hazel and hawthorn trees. A dry ditch ran along one side. The hedge was very old and unmanaged, ran adjacent

to a track/road and had a fence which ran less than half its length;

- 040-HS1-153023 was 2-3m wide and over 4m high. It was a hedgerow of moderate species diversity with five mature trees (hawthorn, willow and ash) and two young field maple standards. The hedge canopy was dominated by hawthorn with frequent elm, blackthorn, bramble and occasional dog rose. The hedge was very old and unmanaged, and had good connectivity with a wet ditch on one side and a fence which ran over half its length;
- 040 -HS1-153025 was 1-2m wide and over 4m high. It was a hedgerow of moderate to high species diversity with one mature oak, three semi-mature willow and three semi-mature wych elm standards. The hedge canopy was mixed with locally abundant holly, frequent wych elm, frequent hawthorn, frequent blackthorn, frequent elder and locally frequent dog rose. A dry ditch bordered one side;
- 040-HS1-153027 was 1-2m wide and over 4m high. It was becoming a tree line with willow pollards and mature oak, elder, hazel and hawthorn trees. There was a dry ditch along one side. The hedge was very old and unmanaged, ran adjacent to a track/road and had a fence which ran less than half its length;
- 040-HS1-153028 was 1-2m wide and over 4m high. It was becoming a tree line with willow pollards and mature oak, elder, hazel and hawthorn trees. There was a dry ditch along one side. The hedge was very old and unmanaged, ran adjacent to a track/road and had a fence which ran less than half its length;
- 040-HS1-153036 was 1-2m wide and 2-3m high. It was a species poor hedge with two mature oak standards, moderate connectivity and a dry ditch on one side. The hedge canopy was dominated by blackthorn with rarely occurring hawthorn, elder and ash and frequent rose. The hedge was unmanaged;
- 040-HS1-154004 was 2-3m wide and 2-4m high. It was a hedgerow of moderate species diversity with seven mature ash, one mature Italian alder (*Alnus cordata*), one semi-mature small-leaved lime and one mature oak standard, with good connectivity and a wet ditch bordering it. The hedge canopy was dominated by hawthorn with occasional oak, ash and bramble and rare gorse. The hedge was unmanaged, ran adjacent to a track/road and had a fence which ran over half its length;
- 040-HS1-154030 was 1-2m wide and over 4m high. It was a hedgerow of moderate species diversity with frequent mature and young trees, a hedge bank and a hedge canopy consisting of frequent hawthorn, blackthorn and elder with occasional willow and rose along with bramble and ivy;
- 040-HS1-154042 was 1-2m wide and over 4m high. It was a hedgerow of moderate species diversity with one mature ash and one mature oak standard and high connectivity. The hedge canopy was dominated by hawthorn with frequent blackthorn, rarely occurring rose, elm and honeysuckle and occasional elder;

- 040-HS1-154046 was 2-3m wide and over 4m high. It was a very mature hedge line with previous hazel coppice and high connectivity. The unmanaged hedge had a fence which ran over half its length;
- 040-HS1-154050 was 2-3m wide and 1-2m high. It was a hedgerow of moderate species diversity with one mature ash tree alongside a road and poor connectivity. A dry ditch ran alongside it and hedgerow species include hawthorn, blackthorn, wych elm, rose, ash and elder along with bramble;
- 040-HS1-154051 was 2-3m wide and 2-4m high. It was a species-rich hedge with three mature oak, five mature ash, one young crack willow and one young hawthorn standard. The hedge canopy was mixed locally frequent blackthorn, frequent hawthorn, occasional bramble, elder and rose with rare hazel. A wet ditch bordered one side;
- 040-HS1-154053 was 1-2m wide and 2-4m high. It was a species-rich hedge with eight mature oak and four mature ash standards and good connectivity. The hedge canopy was dominated by hawthorn with frequent to locally abundant ash, frequent elm, oak, blackthorn and elder and occasional holly and rose. Wood avens and foxglove were present as notable ground flora. The hedge was cut/trimmed and located adjacent to a track/road;
- 040-HS1-154061 was 1-2m wide and 1-2m high. It was a short hedgerow of moderate species diversity with mature and young ash and willow trees, a wet ditch to one side, a parallel hedge within 15m, good connectivity, and a hedge canopy dominated by hawthorn with occasional to rare elder, ash, rose, field maple and bramble;
- 040-HS1-154062 was 1-2m wide and 1-2m high. It was a species-rich hedge with three semi-mature oak, one mature blackthorn and three mature cherry standard, moderate connectivity. The hedge canopy was dominated by hawthorn with frequent elm, locally abundant wych elm, occasional sycamore, elder, rose, bramble and rarely occurring oak, no notable ground flora observed, arable field margin nit present. Hedge was cut / trimmed;
- Hedgerow 040-HS1-154063 was 1-2m wide and 1-2m high. It was a species-rich hedge with no mature trees and moderate connectivity. The hedge canopy was dominated by hawthorn with locally dominant elm, abundant field maple, frequent wych elm and dog rose and occasional elder, rose and bramble. Lords-and-ladies was present as notable ground flora. The hedge was cut/trimmed;
- 040-HS1-154066 was 1-2m wide and 1-2m high. It was a species-rich hedge with one semi-mature oak standard and poor connectivity. The hedge canopy was dominated by hawthorn with locally dominant elm, frequent wych elm and oak and occasional rose, dog rose and bramble. No notable ground flora was observed. The hedge was cut/trimmed;
- 040-HS1-155006 was 2-3m wide and 2-4m high. It was a species-rich hedge with two mature oak, three mature and two semi-mature ash standards and

good connectivity. The hedge canopy was dominated by hawthorn with frequent to locally abundant ash, frequent oak and elder, occasional holly, blackthorn and holly with bramble and ivy. Wood avens was present as notable ground flora. The hedge was cut/trimmed and located adjacent to a track/road;

- 040-HS1-155010 was 2-3m wide and 2-4m high. It was a species-rich hedge with five mature and two young ash, one mature oak and one mature field maple standard. The hedge canopy was mixed with frequent hawthorn, occasional bramble, English elm and blackthorn. Rare holly, elder, ash, field maple and wych elm were also present. Wood avens was present as notable ground flora. A hedge bank to 0.5m bordered one side and the hedge was adjacent to a track/road and runs parallel to another hedge within 15m;
- 040-HS1-155013 was 1-2m wide and over 4m high. It was a species-rich hedgerow with six mature oak standards. The hedge canopy was mixed with frequent ash, ivy and hawthorn, with occasional blackthorn, dog rose, elm, oak and elder. A wet ditch bordered one side of the unmanaged hedge and a fence ran less than half the length of the hedgerow, while a parallel hedge ran within 15m;
- 040-HS1-155014 was 0-1m wide and 2-4m high. It was a species-rich hedge with four semi-mature ash standards. The hedge canopy supported mixed abundant hawthorn, frequent dog rose and occasional field maple, ash, wych elm, oak and bramble. A grass verge bordered one side of the unmanaged hedge, while a fence ran less than half its length and a parallel hedge ran within 15m;
- 040-HS1-155016 was 2-3m wide and over 4m high. It was a hedgerow of moderate species diversity with six young hawthorn trees and one crab-apple tree. The hedgerow canopy species included occasional field maple, ash, elder, hawthorn, blackthorn and bramble. The hedgerow had a dry ditch;
- 040-HS1-155019 was 2-3m wide and over 4m high. It was a hedgerow of moderate species diversity with three mature trees (oak and crack willow) and three young trees (oak and hawthorn). The hedgerow canopy consisted of a mixture of hawthorn, bramble and elder with occasional rose and ivy;
- 040-HS1-155020 was 2-3m wide and 2-4m high. It was a species-rich hedgerow with one mature oak tree, a hedge bank, a dry ditch with common reed and a mixture of hedgerow canopy species including occasional blackthorn, rose and bramble along with rarely occurring hawthorn, hazel, field maple, elder and crab-apple;
- 040-HS1-155022 was 1-2m wide and over 4m high. It was a hedgerow of moderate species diversity with six young field maple and five young elm standards. The hedge canopy was mixed with frequent elm, hawthorn, blackthorn and field maple as well as occasional elder, small-leaved lime and dog rose. It was unmanaged and becoming defunct. A fence ran less than half its length, while a parallel hedge ran within 15m;

- 040-HS1-155024 was 2-3m wide and over 4m high. It was a hedgerow of moderate species diversity with six mature trees including oak, ash, small-leaved lime and field maple along with six young trees including oak, ash, hawthorn and field maple. The hedgerow had a dry ditch, good connectivity and a hedgerow canopy consisting of abundant hawthorn, blackthorn and occasional small-leaved lime, oak, elder, rose, field maple, bramble, ivy and black bryony (*Dioscorea communis*);
- 040-HS1-155028 was 1-2m wide and over 4m high. It was a species-rich hedge with five young oak, two young field maple and one semi-mature small-leaved lime standard. The hedge canopy was mixed with abundant oak, occasional small-leaved lime, rowan, hawthorn, guelder rose, hazel, field maple, wayfaring tree and spindle (*Euonymus sp.*) present;
- 040-HS1-155030 was 2-3m wide and over 4m high. It was a species-rich hedgerow with one mature ash tree and seventeen young trees including hawthorn, crab-apple and oak. The hedgerow had a dry ditch and a small hedge bank. The hedgerow canopy consisted of abundant blackthorn, frequent hawthorn, crab-apple and occasional oak, bramble, elder and rose;
- 040-HS1-155033 was 2-3m wide and over 4m high. It was a species diverse hedge with two mature oak and two ash, thirteen oak and five semi-mature field maple. The hedge canopy was dominated by hawthorn with frequent elder and hazel and occasional field maple, willow, holly and elm. The hedge was unmanaged and becoming defunct. A fence ran less than half its length;
- 040-HS1-155034 was 0-1m wide and 2-4m high. It was a species-rich hedge with four semi-mature oak, one semi-mature ash and one semi-mature holly standard. The hedge canopy was a mixture of abundant hawthorn, frequent holly, rare dogwood, occasional wayfaring tree, rare elder and rare spindle; it is cut/trimmed and positioned adjacent to the track/road;
- 040-HS1-155035 was 2-3m wide and over 4m high. It was a species-rich hedgerow with three young trees (willow and oak), a small hedge bank, a dry ditch and a hedgerow canopy consisting of predominantly hawthorn and blackthorn along with oak, rose, elder, crab-apple and bramble;
- 040-HS1-155036 was 2-3m wide and over 4m high. It was a species-rich hedgerow with eight young trees including a small-leaved lime tree, field maple and oak trees. The hedgerow canopy species included occasional hawthorn, hazel, guelder rose, rowan, small-leaved lime, field maple, wayfaring tree and spindle;

8.4.6 The hedgerows in the Balsall Common and Hampton-In-Arden area (CFA23) were typically well established and diverse in terms of Schedule 3 woody species and mature trees including large and small leaved lime. The hedgerows were typically regularly cut and maintained resulting in many hedgerows being defined and well established. The land management practices, regular soil improvement and intensive farming regimes taking place on the land around hedgerows limited the area and suitable habitat conditions in which Schedule 2 ground flora species could become

established, demonstrated by a low diversity of Schedule 2 ground flora species observed during field surveys. The hedgerows were well connected, providing a network of good habitat corridors and foraging links for a variety of fauna, however the Rugby to Birmingham rail line prevented direct connection between hedgerows on land north and south of the rail cutting.

Birmingham Interchange and Chelmsley Wood area (CFA24)

- 8.4.7 Within the Birmingham Interchange and Chelmsley Wood area (CFA24), 163 hedges were identified for survey and assessed during field surveys.
- 8.4.8 Of the 163 hedgerows:
- 25 were 'important' under the wildlife and landscape criteria of The Hedgerows Regulations 1997;
 - 24 were of 'conservation priority' (as having a HEGS score of -2 or better);
 - one contained a notable woody species (listed in Schedule 3 of The Hedgerows Regulations 1997), notably small-leaved lime;
 - nine had associated notable ground flora (listed in Schedule 2 of The Hedgerows Regulations 1997); and
 - none were noted as being used by protected species.
- 8.4.9 No records of notable hedgerow flora within 250m of the area proposed were received.
- 8.4.10 The important hedgerows are described here:
- 040-HS1-155039 was 2-3m wide and 2-4m high. It was a species-rich hedge with one semi-mature cherry and one semi-mature ash, one mature oak and one mature sycamore standard. The hedge canopy was dominated by hawthorn with frequent blackthorn, occasional guelder rose, frequent dog rose and occasional bullace present. A fence ran along over half its length adjacent to a track/road. The hedgerow sides were trimmed but not the hedge top; and
 - 040-HS1-156002 was 1-2m wide and 1-2m high. It was a hedgerow of moderate species diversity with two mature cherry, one semi-mature alder and one semi-mature ash standard. The hedge canopy was dominated by hawthorn with occasional blackthorn. A grass verge bordered one side, a fence ran over half the length of the managed hedgerow and the hedge was adjacent to a track/road.
 - 040-HS1-156004 was 2-3m wide and over 4m high. It was a hedgerow of moderate species diversity with young ash and oak standard and good connectivity. The hedge canopy consisted of mixed abundant blackthorn and frequent hawthorn, occasional guelder rose, and occasional to rare rose. The hedge was adjacent to track/road;
 - 040-HS1-156008 was 2-3m wide and over 4m high. It had good connectivity and contained five young ash and one young oak standard. The hedge canopy

contained mixed abundant blackthorn and frequent hawthorn, occasional guelder rose and occasional to rare rose. The hedge was adjacent to a track/road;

- 040-HS1-156012 was a species poor hedgerow with a line of planted trees within 2m and good connectivity. Trees included silver birch, small-leaved lime and ash with the hedge canopy dominated by hawthorn, with the hedge being adjacent to a track/road;
- 040-HS1-156013 was 2-4m high and 1-2m wide. It was a species-rich hedgerow with one mature oak, one semi-mature and one mature ash standard and good connectivity. The hedge canopy was mixed abundant hawthorn, occasional field maple, rare elder, rare hazel, rare dogwood and rare rose;
- 040-HS1-156016 was 1-2m wide and 2-4m high. It had good connectivity and was a species-rich hedge with three mature ash, one mature oak and one young ash standard. The hedge canopy was mixed abundant hawthorn with occasional field maple, rare hazel and ash and occasional elder and blackthorn. Ground flora included wood avens, wood dock and wood forget-me-knot (*Myosotis sylvatica*);
- 040-HS1-156020 was 2-3m wide and over 4m high. It was a species-rich hedge with six mature oak standard and good connectivity. The hedge canopy was hawthorn dominated with rare elder, rare ash, rare wych elm, rare elder, rare crab-apple, occasional to rare rose, with bullace present.
- 040-HS1-156023 was 2-3m wide and over 4m high. It was a species-rich hedge with sycamore, elm, ash, cherry and oak semi-mature standards. The hedge canopy was dominated by hawthorn with frequent wych elm and frequent elm. A fence ran along more than half its length and the hedgerow was adjacent to a track/road;
- 040-HS1-156024 was 1-2m wide and 2-4m high. It was a hedgerow of moderate species diversity with one young oak standard. The hedge canopy was dominated by blackthorn with occasional field maple, frequent elder and frequent hawthorn present. A fence ran over half the length of the unmanaged hedgerow with a road adjacent to the hedgerow;
- 040-HS1-156029 was 2-3m wide and 2-4m high with good connectivity. It was a hedgerow with moderate species diversity and no standards. The hedge canopy consisted of abundant hawthorn, rare English elm, occasional elder, occasional bramble, rare rose, rare field maple and rare blackthorn. Bittersweet was present within the hedge as notable flora;
- 040-HS1-156030 was 2-30m wide and 2-40m high with good connectivity. It was a species-rich hedge with three mature ash, one mature oak and two young hawthorn standard. The hedge canopy was dominated by blackthorn with occasional to rare hazel, locally abundant crack willow and grey willow, elder, occasional to rare English elm, and rare dog rose. There was a bank to 0.5m on one side along with a shallow wet ditch on one side. Wood dock was

present as notable ground flora;

- 040-HS1-156031 was 2-3m wide and over 4m high with good connectivity. It was a species-rich hedge with sycamore, elm, ash, cherry and oak semi-mature standard. The hedge canopy was dominated by hawthorn with frequent wych elm, frequent elm and occasional bramble present. The hedge had a fence along more than half its length and was adjacent to a track/road;
- 040-HS1-156036 was 0-1m wide and 2-4m high with good connectivity. It was a species-rich hedge with three mature and one young ash, one young hawthorn, five mature willow and one young field maple standard. The hedge canopy was dominated by hawthorn with rare ash, rare elder, rare rose, and rare holly also present. Wood dock and herb robert were present as notable ground flora. A hedge bank to 0.5m bordered one side as did a wet ditch for 1/5 of the total length. There was a parallel hedge within 15m and it was adjacent to a track/road;
- 040-HS1-156038 was 2-3m wide and 2-4m high with good connectivity. It was a species-rich hedgerow with many mature and young trees including twelve mature oak, one mature wych elm, two young field maple, one young elm and one mature crab-apple standard. The hedge canopy consisted of abundant to dominant blackthorn with occasional hawthorn, frequent bramble, rare rose, rare hazel and occasional elder. There was a bank to 0.5m on one side along with a shallow dry ditch on one side. Broad buckler fern was present as notable ground flora. There was a parallel hedge within 15m and it was adjacent to a track/road;
- 040-HS1-156039 was 1-2m wide and 1-2m high with good connectivity. It was a moderately species diverse hedge with one mature oak and one mature ash standard. The hedge canopy was dominated by hawthorn with occasional elder, occasional wych elm and rare hazel. The hedge was unmanaged and adjacent to a track/road;
- 040-HS1-157003 was 2-3m wide and 2-4m high with good connectivity. It was a species-rich hedgerow with three mature and one young wych elm and one mature oak. The hedge canopy consisted of abundant hawthorn with other species including rare blackthorn, occasional to rare elder, locally abundant dogwood and rare domestic apple. There was an unconfirmed Midland hawthorn hybrid occurring rarely. There was a parallel hedge within 15m and it was adjacent to a track/road;
- 040-HS1-157004 was 2-3m wide and over 4m high with good connectivity. It was a species-rich hedge with six mature oak, one mature and one young crack willow and one mature ash standard. The hedge canopy was mixed abundant hawthorn and abundant blackthorn with rare wych elm, rare elder, rare willow sp. occasional ivy and occasional bramble present;
- 040-HS1-157005 was 1-2m wide, 1-2m high and good connectivity. It was a hedgerow of moderate species diversity with three mature oak trees within the hedge and ten semi-mature trees including beech, hornbeam (*Carpinus*

betulus), oak and elm within 2m of the hedge line, becoming greater than 5m wide scrubby woodland. The hedge canopy was dominated by hawthorn with frequent gorse and ivy and occasional bramble and elder. No notable ground flora was observed. The hedge was cut/trimmed and adjacent to a track/road;

- 040-HS1-158003 was 1-2m wide and 2-4m high with good connectivity. It was a hedgerow of moderate species diversity with no standard, moderate connectivity. Hedge canopy was dominated by hawthorn with frequent bird cherry, cherry and elder, rarely occurring whitebeam, occasional wayfaring tree and Norway maple. Hedge was cut / trimmed with a fence which ran more than half its length and adjacent to a track/road;
- 040-HS1-158006 was 2m wide and 2-4m high with good connectivity. It was a hedgerow of moderate species diversity with two mature silver birch and three mature poplar standards and two semi-mature alder. The hedge canopy was dominated by hawthorn with occasional gorse, dogwood, and hazel and rare cherry. The hedgerow had a parallel hedge within 15m, grass verge greater than 2m on one side, was unmanaged and adjacent to a track/road;
- 040-HS1-158009 was 2m wide and 2-4m high with good connectivity. It was a hedgerow of moderate species diversity with two mature silver birch and three mature poplar standard and two semi-mature alder. The hedge canopy was dominated by hawthorn with occasional gorse, dogwood, and hazel and rare cherry. The hedgerow had a parallel hedge within 15m, a grass verge greater than 2m on one side, is unmanaged and adjacent to a track/road;
- 040-HS1-158014 was 1-2m wide and over 4m high with good connectivity. It was a species-rich hedge with two mature oak standard and twelve semi-mature standard including wych elm, silver birch, field maple and oak. Hedge canopy was mixed with locally dominant hawthorn and blackthorn, occasional hazel and wych elm, frequent elm and field maple and rare holly. The hedgerow was managed, had a grass verge greater than 2m on one side and was adjacent to track/road;
- 040-HS1-158015 was 2-3m wide and 2-4m high with good connectivity; and
- 040-HS1-159002 was 2-3m wide and 2-4m high. It was a species-rich hedge with one mature alder and one semi-mature hawthorn standard and good connectivity (pond). Hedge canopy was mixed abundant hawthorn, frequent elm, alder and occasional hazel, elder, holly and honeysuckle. Herb robert was present as notable ground flora. The hedge was cut/trimmed.

8.4.11 The hedgerows in the Birmingham Interchange and Chelmsley Wood area (CFA24) were typically well established with mature trees and were of moderate diversity in terms of Schedule 3 woody species. Land management and usage provided little suitable habitat in which Schedule 2 ground flora could flourish as demonstrated by the low diversity of notable ground flora observed during the field surveys. The hedgerows were also typically not well maintained or cut regularly resulting in many hedgerows becoming defunct or becoming scrub/woodland. The hedgerows were well

connected within discrete land parcels, however major arterial roads pose barriers to connection between the wider area (lands north of the A452 Kenilworth Road and south of the M42).

Castle Bromwich and Bromford area (CFA25)

8.4.12 Within the Castle Bromwich and Bromford area (CFA25), 44 hedges were identified. One hedgerow was not surveyed due to land access constraints.

8.4.13 Of the 43 hedgerows surveyed:

- none were 'important' under the wildlife and landscape criteria of The Hedgerows Regulations 1997;
- one was of 'conservation priority' (having a HEGS score of -2 or better);
- none contained notable woody species (listed in Schedule 3 of The Hedgerows Regulations 1997);
- one was found to have associated notable ground flora herb robert and wood dock (listed in Schedule 2 of the Hedgerows Regulations 1997); and
- none had evidence of being used by protected species.

8.4.14 No records of notable hedgerow flora within 250m of the land required for the construction of the Proposed Scheme were received for the Castle Bromwich and Bromford area (CFA25).

8.4.15 The Castle Bromwich and Bromford area (CFA25) contained very few hedgerows that required field survey due to the highly urbanised nature of the landscape. Hedgerows that were identified for survey from aerial photography were found to be of low diversity in terms of Schedule 3 woody species and Schedule 2 ground flora and therefore not assessed as important under the wildlife and landscape criteria of The Hedgerow Regulations 1997.

Washwood Heath to Curzon Street area (CFA26)

8.4.16 Within the Washwood Heath to Curzon Street area (CFA26), 72 hedges were identified. Two hedgerows were not surveyed due to land access constraints.

8.4.17 Of the 70 hedgerows surveyed:

- two were 'important' under the wildlife and landscape criteria of The Hedgerows Regulations 1997, both of which were found alongside the Grand Union Canal SLINC;
- two were a 'conservation' (having a HEGS score of -2 or better), both of which were found alongside the Grand Union Canal SLINC;
- one contained notable woody species (listed in Schedule 3 of The Hedgerows Regulations 1997); and
- one had associated notable ground flora (listed in Schedule 2 of The Hedgerows Regulations 1997).

8.4.18 No records of notable hedgerow flora within 250m of the area proposed were received.

8.4.19 The important hedgerows are described here:

- 040-HS1-172001 ran alongside a PRow and was 1-2m wide and over 4m high. It contained one mature sycamore tree, one young cherry tree and one young willow tree, as well as a diverse mix of woody species dominated by hawthorn and hazel along with less frequently occurring species including silver birch, field maple, guelder rose, rose, butterfly-bush and Swedish whitebeam (*Sorbus x intermedia*). This hedge had no notable ground flora observed at the time of survey; and
- 040-HS1-173001 ran alongside a PRow. It was 1-2m wide and over 4m high with no mature or young trees. It supported species including hawthorn, hazel, guelder rose, butterfly-bush, rose, hornbeam, rose, elder, willow and field maple. No notable ground flora was observed at the time of survey.

9 Ditch survey

9.1 Introduction

- 9.1.1 This section of the appendix presents details of the ditch surveys and associated baseline data for the section of the Proposed Scheme that will pass through CFA23, CFA24, CFA25 and CFA26.

9.2 Methodology

- 9.2.1 Details of the standard methodology used for ditch surveys are provided in the Ecology technical note: Ecological field survey methods and standards (Volume 5: Appendix CT-001-000/2).
- 9.2.2 A desk study did not return any records for any ditches within CFA23, CFA24, CFA25 and CFA26.

9.3 Deviations, constraints and limitations

- 9.3.1 Ditches were scoped for survey based on the requirements set out in the methodology and the findings of the Phase 1 Habitat surveys (where available). Detailed ditch surveys were required where a ditch was likely to hold permanent water, had not been heavily managed, supported diverse and/or otherwise notable flora/fauna that could not be described by the Phase 1 Habitat Survey and was likely to be significantly affected by the scheme.
- 9.3.2 Surveys were undertaken of ditches, but also of small, running watercourses which were not included in the River Corridor Survey assessments.
- 9.3.3 One ditch was identified as requiring a ditch survey but could not be accessed. Details are given in Table 61.

Table 61: Summary of locations where requirement for ditch survey was identified, but no access available for survey

Survey site name	Survey location	Description	CFA	Distance from land required for the construction of the Proposed Scheme ¹³⁸ (m) and orientation
Land drain at Bayleys Brook	SP 22801 79879	Land drain in arable field, adjacent to Bailey's Brook.	23	50m, north

- 9.3.4 The quality of the surveyed ditches was assessed using the 'Manual for the survey and evaluation of the aquatic plant and invertebrate assemblages of grazing marsh ditch systems'¹³⁹. Native species richness for both invertebrates and plants is the number of native aquatic ditch species recorded. Native species conservation status for both invertebrates and plants is the mean conservation score of the native species

¹³⁸ The phrase 'Within land required' represents an abbreviation of this term

¹³⁹ Palmer M., Drake M. and Stewart N. (2013) Manual for the Survey and Evaluation of the Aquatic Plant and Invertebrate Assemblages of grazing marsh ditch systems, Buglife.

recorded. Habitat quality for plants is the mean Habitat Quality Score of all species recorded and for invertebrates is the mean Habitat Quality Score of all species recorded. Naturalness for both plants and invertebrates is the sum of the "threat score" for each introduced species recorded.

9.3.5 As the Buglife manual was intended for use with 'coastal grazing marshes and river floodplains grazing marshes near the coast', the conservation status of the ditches was assessed using 'The Conservation of Freshwater Macro-invertebrate Populations: a Community-based Classification Scheme'¹⁴⁰, and was based on the Community Conservation Index (CCI) score¹⁴¹, as follows:

- CCI < 5: Low conservation value;
- 5 < CCI < 10: Moderate conservation value;
- 10 < CCI < 15: Fairly High conservation value;
- 15 < CCI < 20: high conservation value; and
- CCI > 20: Very High conservation value.

9.4 Baseline

9.4.1 A summary of results from the ditch surveys is presented in Table 62 and in Map Series EC-10 (Volume 5, Map Book Ecology).

¹⁴⁰ Chadd, R. and Extence, C. (2004). The conservation of freshwater macro-invertebrate: a community-based scheme. *Aquatic Mar. Freshw. Ecosyst.* 14:597-624.

¹⁴¹ The CCI score was calculated on the basis of individual conservation scores assigned to each species recorded.

Table 62: Summary of results from ditch surveys conducted in CFA23, CFA24, CFA25 and CFA26

Ecology survey code	OS Grid Reference Start and Finish	Survey date	Summary of results	CFA	Distance from land required for the construction of the Proposed Scheme ¹⁴² (m) and orientation
040-DS1-148001	SP 25435 77233 to SP 25312 77087	13 May 2012; 28 March 2013	Wet ditch of low conservation value running along hedge in pasture field. Moderate plant diversity with no notable species recorded. Plant scores: Native species richness: 1; Native species conservation status: 1; Habitat quality: 1; Naturalness: 0. Moderate macro-invertebrate diversity. Notable invertebrate species: <i>Agabus paludosus</i> (a diving beetle, Local in Buglife, 2010, conservation score 1, Very common). Invertebrate Scores: CCI (Community Conservation Index) score: 1.14; Native species richness: 11; Native species conservation status: 1.17; Habitat quality: 1; Naturalness: 0.	23	Within land required
040-DS1-148002	SP 25596 76806 to SP 25166 77030	13 September 2012	Wet ditch of low conservation value, running alongside a hedge; situated within a pasture field. Moderate plant diversity with no notable species recorded. Plant scores: Native species richness: 2; Native species conservation status: 1; Habitat quality: 1; Naturalness: 0. Moderate macro-invertebrate diversity with notable species <i>Zonitoides nitidus</i> (a gastropod snail, conservation score 4, Occasional). Invertebrate scores: CCI score: 4.3; Native species richness: 13; Native species conservation status: 1; Habitat quality: 1; Naturalness: 0.	23	Within land required
040-DS1-148003	SP 24821 77239 to SP 24892 77312	04 August 2012; 28 March 2013	Wet ditch of high conservation value located in pasture field, adjacent to a hedge; little to no management. Moderate plant diversity with no notable species recorded. Plant scores: Native species richness: 5; Native species conservation status: 1; Habitat quality: 1.5; Naturalness: 0. Moderate macro-invertebrate diversity with the following notable species recorded: <i>Aplexa hypnorum</i> (moss bladder snail, conservation score 5, Local); <i>Rhantus suturalis</i> (a diving beetle, conservation score 7, Notable) and <i>Helochaeres lividus</i> (a water scavenger beetle conservation score 7,	23	Within land required

¹⁴² The phrase 'Within land required' represents an abbreviation of this term

Ecology survey code	OS Grid Reference Start and Finish	Survey date	Summary of results	CFA	Distance from land required for the construction of the Proposed Scheme ¹⁴² (m) and orientation
			Notable); <i>Anisus leucostoma</i> (a ram's horn snail, conservation score 5, Local); and <i>Limnephilus bipunctatus</i> (a caddis fly larva, conservation score 5, Local) and the non-native freshwater shrimp <i>Crangonyx pseudogracilis</i> . Invertebrate scores: CCI score: 18.9; Native species richness: 17; Native species conservation status: 1.2; Habitat quality: 1.2; Naturalness: -3 (global).		
040-DS1-149001	SP 24409 77918 to SP 24812 77984	13 September 2012	Small wet ditch of low conservation value running alongside a hedge, as a tributary of Bayleys Brook Low plant diversity with no notable species recorded. Plant scores: Native species richness: 0; Native species conservation status: none. Low macro-invertebrate diversity with the non-native <i>Potamopyrgus antipodarum</i> recorded (<i>New Zealand mud snail</i>) Invertebrate scores: CCI score: 1; Native species richness: 9; Native species conservation status: none; Habitat quality: 1; Naturalness: -2.	23	10m, north-east
040-DS1-153001	SP 21712 80814 to SP 22023 81008	05 September 2012	Wet ditch (part of River Blythe Bypass) of low conservation value, running alongside a hedge and heavily shaded. No aquatic plants were recorded. Low macro-invertebrate diversity with notable species: <i>Cloeon simile</i> (a mayfly larva, local in Buglife, 2010) (conservation score 2, common). Invertebrate scores: CCI score: 1.33; Native species richness: 8; Native species conservation status: none; Habitat quality: 1; Naturalness: 0.	23	Within land required
040-DS1-153002	SP 21338 80983 to SP 21530 80953	05 September 2012	Dry ditch of low conservation value located alongside a hedge in pasture field. Tributary of River Blythe SSSI.	23	100m, south-west
040-DS1-153003	SP 21366 80652 to SP 21498 80568	05 September 2012	Dry ditch of low conservation value located in pasture field. Tributary of River Blythe SSSI.	23	260m, south-west
040-DS1-153004	SP 21434 81138 to SP 21494	05 September 2012; 03 June 2013	Large ditch of low conservation value, set within a pasture field. Moderate macro-invertebrate diversity with notable species: <i>Hesperocorixa linnaei</i> (a lesser water boatman, conservation score 4, Occasional) and non-native species: <i>Crangonyx pseudogracilis</i> (a	23	20m, south-west

Ecology survey code	OS Grid Reference Start and Finish	Survey date	Summary of results	CFA	Distance from land required for the construction of the Proposed Scheme ¹⁴² (m) and orientation
	81301		<i>freshwater shrimp</i> and <i>Potamopyrgus antipodarum</i> (New Zealand mud snail). Invertebrate scores: CCI score: 4.4; Native species richness: 12; Native species conservation status: 1; Habitat quality: 1; Naturalness: -5.		
040-DS1-153005	SP 21892 81519 to SP 21963 81350	05 September 2012; 03 June 2013	Small running ditch (part of River Blythe Bypass) of low conservation value, set within pasture fields, with pools and riffles. Low aquatic vegetation diversity with no notable species recorded. Plant scores: Native species richness: 4; Native species conservation status: 1; Habitat quality: 1.25; Naturalness: 0. Low macro-invertebrate diversity with non-native species: <i>Potamopyrgus antipodarum</i> (New Zealand mud snail) and the freshwater shrimp <i>Crangonyx pseudogracilis</i> . Invertebrate scores: CCI score: 1; Native species richness: 4; Native species conservation status: none; Habitat quality: 1; Naturalness: -5.	23	120m, north-east
040-DS1-153006	SP 21890 81291 to SP 22041 81046	05 September 2012; 03 June 2013	Ditch (part of River Blythe Bypass) of high conservation value, running alongside a hedge within an arable field. Heavily shaded with low aquatic vegetation diversity. Moderate macro-invertebrate diversity with notable species: <i>Aplexa hypnorum</i> (moss bladder snail, conservation score 5, local), <i>Rhantus suturalis</i> (a diving beetle, conservation score 7, notable) and <i>Anisus leucostoma</i> (a ram's horn snail, conservation score 5), as well as non-native species: a freshwater shrimp <i>Crangonyx pseudogracilis</i> . Plant scores: Native species richness: 1; Native species conservation status: 1; Habitat quality: 1; Naturalness: 0. Invertebrate scores: CCI score: 20.3; Native species richness: 8; Native species conservation status: 1.25; Habitat quality: 1.12; Naturalness: -3.	23	Within land required
040-DS1-153007	SP 21897 81291 to SP 21965 81348	05 September 2012	Dry ditch of low conservation value, set in pasture field.	23	40m, north-east

Ecology survey code	OS Grid Reference Start and Finish	Survey date	Summary of results	CFA	Distance from land required for the construction of the Proposed Scheme ¹⁴² (m) and orientation
040-DS1-153008	SP 21833 81477 to SP 21885 81289	05 September 2012; 03 June 2013	<p>Ponded ditch of low conservation value, running alongside a hedge within a pasture field. Low aquatic vegetation diversity with no notable species recorded.</p> <p>Plant scores: Native species richness: 5; Native species conservation status: 1; Habitat quality: 1.4; Naturalness: 0.</p> <p>Initial attempts at sampling did not collect any invertebrates and further sampling was not possible.</p>	23	10m, north-east
040-DS1-153009	SP 22144 81149 to SP 22349 80908	03 June 2013	<p>Ditch (tributary of Horn Brook) of low conservation value. Low aquatic vegetation diversity with no notable species recorded.</p> <p>Plant scores: Native species richness: 2; Native species conservation status: 1; Habitat quality: 1.5; Naturalness: 0.</p> <p>Moderate macro-invertebrate diversity with .non-native species: <i>Potamopyrgus antipodarum</i> (New Zealand mud snail).</p> <p>Invertebrate scores: CCI score: 5; Native species richness: 11; Native species conservation status: 1; Habitat quality: 1; Naturalness: -2.</p>	23	Within land required
040-DS1-153010	SP 22392 81321 to SP 22147 81155	03 June 2013	<p>Ditch (Horn Brook) of low conservation value. Low aquatic vegetation diversity with no notable species recorded.</p> <p>Plant scores: Native species richness: 1; Native species conservation status: 1; Habitat quality: 1; Naturalness: 0.</p> <p>Low macro-invertebrate diversity with .non-native species: <i>Potamopyrgus antipodarum</i> (New Zealand mud snail)</p> <p>Invertebrate scores: CCI score: 1.5; Native species richness: 4; Native species conservation status: none; Habitat quality: 1; Naturalness: -2.</p>	23	Within land required
040-DS1-154001	SP 21492 81697 to SP 21739 81724	05 September 2012; 03 June 2013	<p>Ditch of low conservation value located in pasture field. Tributary of River Blythe SSSI. Low plant diversity with no notable species.</p> <p>Plant scores: Native species richness: 2; Native species conservation status: 1; Habitat quality: 2; Naturalness: 0.</p> <p>Low macro-invertebrate diversity with notable species: <i>Zonitoides nitidus</i> (a gastropod snail, conservation score 4, Occasional) recorded.</p> <p>Invertebrate scores: CCI score: 7; Native species richness: 4; Native species conservation status: none;</p>	23	Within land required

Ecology survey code	OS Grid Reference Start and Finish	Survey date	Summary of results	CFA	Distance from land required for the construction of the Proposed Scheme ¹⁴² (m) and orientation
			Habitat quality: 1; Naturalness: 0.		
040-DS1-155001	SP 20897 82480 to SP 21144 82472	06 September 2012	Ponded ditch of low conservation value set in arable field, with very few wet areas at time of survey. Heavily shaded with no aquatic vegetation. Very few invertebrates present (following site assessment), probably due to the watercourse drying up. No invertebrate sample taken (the ditch was too dry to be sampled at the time of the survey)	24	Within land required
040-DS1-156001	SP 20902 84353 to SP 21108 84116	06 June 2013	Fairly fast flowing stream of low conservation value set in woodland. Tributary of River Blythe SSSI. Moderate plant diversity with no notable species recorded. <i>Plant scores:</i> Native species richness: 1; Native species conservation status: 1; Habitat quality: 1; Naturalness: 0. Moderate macro-invertebrate diversity with non-native species: <i>Potamopyrgus antipodarum</i> (New Zealand mud snail) recorded. <i>Invertebrate scores:</i> CCI score: 1.14; Native species richness: 11; Native species conservation status: 1; Habitat quality: 1; Naturalness: -2.	24	Within land required
040-DS1-156002	SP 20799 83508 to SP 20705 83206	07 September 2012	Dry ditch of low conservation value running alongside a hedge. Tributary of Hollywell Brook. No aquatic vegetation present.	24	Within land required
040-DS1-168001	SP 14396 90584 to SP 13335 90262	14 September 2012	Fast flowing man-made drain of low conservation value. It appears to receive runoffs from industrial premises. Low aquatic vegetation diversity with no notable species recorded. <i>Plant scores:</i> Native species richness: 2; Native species conservation status: 1; Habitat quality: 1.5; Naturalness: 0. Low macro-invertebrate diversity with notable species: <i>Zonitoides nitidus</i> (a gastropod snail, conservation score 4, Occasional) and non-native species: <i>Potamopyrgus antipodarum</i> (New Zealand	25	Within land required

Ecology survey code	OS Grid Reference Start and Finish	Survey date	Summary of results	CFA	Distance from land required for the construction of the Proposed Scheme ¹⁴² (m) and orientation
			<i>mud snail</i>). Invertebrate scores: CCI score: 4; Native species richness: 9; Native species conservation status: none; Habitat quality: 1; Naturalness: -2.		

- 9.4.2 A total of 15 ditches were surveyed within the Balsall Common and Hampton-in-Arden area (CFA23), of which two were assessed as being of high conservation value owing to the aquatic invertebrate assemblages they support. Ditch 040-DS-148003 on the land south of Berkswell Station was considered to be of high conservation value, given the presence of two notable (conservation score 7, 'Notable') species of beetles: *Rhantus suturalis* (a diving beetle) and *Helochares lividus* (a water scavenger beetle). Ditch 040-DS1-153007 on the land west of A452 Kenilworth Road and south of B4102 Meriden Road was considered to be of high conservation value due to the presence of the notable species of diving beetle (conservation score 7 'Notable') *Rhantus suturalis*.
- 9.4.3 A total of three ditches were surveyed in the Birmingham Interchange and Chelmsley Wood area (CFA24), none of which were assessed as being of high conservation value. These ditches were characterised by the absence of notable species.
- 9.4.4 One ditch was surveyed in the Castle Bromwich and Bromford area (CFA25) and was assessed as not being of high conservation value. This ditch was characterised by the absence of notable species.
- 9.4.5 No ditches were identified as requiring field survey in the Washwood Heath to Curzon Street area (CFA26).
- 9.4.6 None of the ditches were of significant importance in terms of aquatic vegetation recorded.

10 Pond and canal survey

10.1 Introduction

- 10.1.1 This section of the appendix presents details of the pond and canal surveys and relevant associated desk study data for the section of the Proposed Scheme that will pass through CFA23, CFA24, CFA25 and CFA26.

10.2 Methodology

- 10.2.1 Details of the standard methodology used for pond and canal surveys are provided in the Ecology technical note: Ecological field survey methods and standards¹⁴³ (Volume 5: Appendix CT-001-000/2).
- 10.2.2 Surveys followed Predictive System for Multimetrics (PSYM), National Pond Survey (NPS) and Rapid Assessment¹⁴⁴ (RA) protocols in line with the methodology. PSYM and NPS methods collect macro-invertebrate, macrophyte and other field data, while the RA only covered macro-invertebrates (to a lower level of identification, based on a single site sort of samples). Of the three methods, the NPS protocol is the most detailed, with three separate visits, detailed site information and macro-invertebrates identified to species level for most groups, while PSYM required only a single visit and family level macro-invertebrate identification.
- 10.2.3 As set out in the methodology, where ponds were likely to be lost or significantly affected they were subject to survey using PSYM or NPS method. The NPS method was limited to ponds with the most diverse and/or notable flora and fauna, where it was considered that they could not be adequately be assessed using PSYM. Ponds not threatened with loss and only minor effects were subject to the RA method.
- 10.2.4 No desk study records relating to ponds and canals were obtained in support of these surveys.

10.3 Deviations, constraints and limitations

- 10.3.1 Deviations from the methodology occurred as a result of seasonal constraints, for example, the number or timing of seasonal visits for the ponds surveyed using National Pond Survey¹⁴⁵ method, was dependent upon the time at which access became available for survey. Specific deviations are discussed in the text where relevant.
- 10.3.2 The pond west of Hornbrook Farm (040-PS1-153003) was surveyed using rapid assessment survey only as it was outside the land required for the construction of the Proposed Scheme at the time of survey (the pond is now located within the land required for the construction of the Proposed Scheme).

¹⁴³ Arup/URS (2012) HS2 Ecological Surveys: Field Survey Methods and Standards - A report to HS2 Ltd by Arup/URS.

¹⁴⁴ Pond Conservation (2010). The development of the Big Pond Dip invertebrate survey method.

¹⁴⁵ Department for Environment, Food and Rural Affairs; Ponds, Pools and Lochans; <http://adlib.everysite.co.uk/adlib/defra/content.aspx?doc=11588&id=11606>; accessed: 24 June 2013

- 10.3.3 Map series EC-11 (Volume 5, Map Book Ecology) shows the locations of the ponds that were subject to field survey. Table 63 identifies those ponds where the requirement for survey was identified but not undertaken.

Table 63: Summary of locations where requirement for pond survey was identified but no access available for survey

Map code	Pond description	Survey method proposed	CFA	Distance from land required for the construction of the Proposed Scheme ¹⁴⁶ (m) and orientation
EC-11-104-J2	Moderate size pond on edge of woodland south of Hornbrook Farm.		23	Within land required

10.4 Baseline

Scoping

- 10.4.1 Only ponds where there was potential for indirect or direct impact from the Proposed Scheme were scoped for survey. Scoping was undertaken in accordance with the standard methodology, for example ponds that were known to dry up and are likely to hold water for less than four months of the year were excluded from further survey.

Rapid assessment methodology

- 10.4.2 Table 64 provides a summary of the results of rapid assessment methodology surveys through CFA23, CFA24, CFA25 and CFA26.

Table 64: Summary of rapid assessment methodology survey results

Ecology survey code	Pond description ¹⁴⁷	Rapid assessment methodology quality band	CFA	Distance from land required for the construction of the Proposed Scheme ¹⁴⁸ (m) and orientation
040-PS1-148001	On-line ornamental pond, with ducks in farmhouse area. Pond of moderate invertebrate diversity (8 families). RA score of 28.	Moderate quality	23	60m, north-east
040-PS1-148002	Large pond with island at centre. Pond of low invertebrate diversity (6 families). RA score of 12.	Low quality	23	40m, north-east
040-PS1-149001	Circular pond (used for stocking of fisheries) on land east of Lavender Hall Farm. Deep and marginally vegetated pond, highly turbid. Invertebrate species diversity low (9 families). RA score of 18.	Moderate quality	23	40m, south-west
040-PS1-149002	Circular pond west of Baulk Lane in grazed pasture field. Vegetated pond (<i>Glyceria fluitans</i> , <i>Juncus effusus</i>). Invertebrate taxa diversity moderate (9 families). RA	Moderate quality	23	20m, north-east

¹⁴⁶ The phrase 'Within land required' represents an abbreviation of this term

¹⁴⁷ Definitions of different levels of diversity (high/moderate/low) are based on existing guidance (e.g. some guidance for ponds (e.g. <http://adlib.eversite.co.uk/adlib/defra/content.aspx?id=000L3890W.17UT2G7DAA0397>), as well as professional judgement of the potential for diversity expected in the types of ponds surveyed (based on size, habitat, level of identification of specimens collected)

¹⁴⁸ The phrase 'Within land required' represents an abbreviation of this term

Ecology survey code	Pond description ¹⁴⁷	Rapid assessment methodology quality band	CFA	Distance from land required for the construction of the Proposed Scheme ¹⁴⁸ (m) and orientation
	score of 23.			
040-PS1-149003	Shallow, vegetated pond between Lavender Hall Lane and Baulk Lane, of high invertebrate diversity (18 families). RA score of 48.	Good quality	23	50m, north-east
040-PS1-150004	Ornamental pond in private house on the corner of A452 Kenilworth Road and Park Lane, heavily managed. Low invertebrate diversity (4 taxa). RA score of 13.	Low quality	23	10m, south-west
040-PS1-150005	Small, vegetated, ovoid pond at Lavender Hall Farm. Pond of moderate invertebrate diversity (10 families). RA score of 22.	Moderate quality	23	20m, south-west
040-PS1-153001	Ponded ditches in woodland 225m north-west of Hornbrook Farm. Complex of several channels. Black silt substrate. Low invertebrate diversity (5 taxa only). RA score of 13	Low quality	23	10m, north-east
040-PS1-154001	Temporary pond, shallow, with little vegetation and moderate taxa diversity (9 families, including <i>Hydrophilidae</i> and <i>Dytiscidae</i> (water beetles)). RA score of 8.	Low quality	23	40m, north-east
040-PS1-154002	Large pond in pasture field. High habitat diversity. RA score of 57.	Excellent quality	23	140m, north-east
040-PS1-155001	Ovoid ornamental pond in garden of Pasture Farm. Pond of low invertebrate diversity (5 taxa). RA score of 6.	Low quality	23	100m, south- west
040-PS1-158001	Coleshill Pool South. Pond of moderate invertebrate diversity (8 families). RA score of 21.	Low quality	24	90m, east
040-PS1-165001	Pond 4, large open pond in old sludge lagoon. Low invertebrate diversity (4 taxa), pollution tolerant only, indicative of poor water quality.	Low quality	25	Within land required
040-PS1-165002	Pond 3, large open pond in old sludge lagoon. Low invertebrate diversity (3 taxa), indicative of poor water quality.	Low quality	25	30m, north
040-PS1-166001	Pond 2, large open pond in old sludge lagoon. Low invertebrate diversity (4 taxa), indicative of poor water quality.	Low quality	25	40m, north
040-PS1-166002	Pond 1, large open pond in old sludge lagoon. Low invertebrate diversity (2 taxa), all pollution tolerant.	Low quality	25	40m, north

Predictive system for multimetrics (PSYM)

10.4.3 Table 65 provides a summary of the results of Predictive System for Multimetrics (PSYM) surveys through CFA23, CFA24, CFA25 and CFA26.

Table 65: Summary of results from PSYM surveys

Ecology survey code	Pond description	Plants			Invertebrates			General Quality Assessment (GQA)	CFA	Distance from land required for the construction of the Proposed Scheme ¹⁴⁹ (m) and orientation
		Number of submerged and emergent plant species	Trophic ranking score for aquatic and emergence plants	Number of uncommon plant species	Average score per taxon	Number of dragonfly (Odonata) and alderfly (Megaloptera) families	Number of beetle families			
040-PS2-148001	Small, vegetated, marsh in depression (less than 100m ²), with low macrophyte diversity. Moderate diversity of invertebrate fauna (7 BMWP/PSYM taxa), 17 species), including a notable diving beetle (<i>Rhantus suturalis</i> , CS: 7, 'Notable').	3	N/A	0	4.1	0	1	Very poor	23	Within land required
040-PS2-149001	Triangular pond (approx. 300 m ²) in fisheries (used for stocking). Deep and marginally vegetated (low plant diversity), highly turbid. Moderate diversity of invertebrate fauna (9 BMWP/PSYM taxa, 18 species).	2	8.5	0	3.8	0	1	Poor	23	Within land required
040-PS2-149002	Shaded pond (approx. 700 m ²) with island in centre and little vegetation (low diversity). Invertebrate species diversity moderate (9 BMWP/PSYM taxa).	3	9.7	0	3.7	0	1	Poor	23	Immediately adjacent to the east

¹⁴⁹ The phrase 'Within land required' represents an abbreviation of this term

Ecology survey code	Pond description	Plants			Invertebrates			General Quality Assessment (GQA)	CFA	Distance from land required for the construction of the Proposed Scheme ¹⁴⁹ (m) and orientation
		Number of submerged and emergent plant species	Trophic ranking score for aquatic and emergence plants	Number of uncommon plant species	Average score per taxon	Number of dragonfly (Odonata) and alderfly (Megaloptera) families	Number of beetle families			
040-PS2-149008	Small, vegetated pond (approx. 160m ²) in grazed pasture field, with moderate diversity of vegetation and high habitat diversity. Moderate diversity of invertebrate fauna (9 BMWP/PSYM taxa, 15 species).	9	9.2	0	3.7	0	1	Poor	23	Within the land required
040-PS2-150001	Small (approx. 96m ²), shaded pond in woodland, with only duckweed present. Pond of very low invertebrate diversity (0 BMWP/PSYM taxa).	0	9.0	0	0	0	0	Very poor	23	Within land required
040-PS2-150002	Moderate sized pond (approx. 300m ²), with a vegetated (mostly soft rush), marshy area, and some open water, with green, filamentous algae, and supporting a moderate number of wetland plant and invertebrate species (7 BMWP/PSYM taxa, 14 invertebrate species).	10	9.4	0	4.1	0	0	Poor	23	Immediately adjacent to the south
040-PS2-152001	Vegetated pond fed by road runoff (balancing pond) of a moderate size (approx. 500m ²). Water appeared clean and the pond supported a moderate number of plant species and high number of invertebrate taxa (16 BMWP/PSYM taxa). Species level identification of invertebrate demonstrated that 31 species of macro-	8	9.0	0	4.9	2	2	Moderate	23	Immediately adjacent to the west

Ecology survey code	Pond description	Plants			Invertebrates			General Quality Assessment (GQA)	CFA	Distance from land required for the construction of the Proposed Scheme ¹⁴⁹ (m) and orientation
		Number of submerged and emergent plant species	Trophic ranking score for aquatic and emergence plants	Number of uncommon plant species	Average score per taxon	Number of dragonfly (Odonata) and alderfly (Megaloptera) families	Number of beetle families			
	invertebrates were present, including pollution sensitive caddis and mayfly and a notable species of diving beetle (<i>Hygrotus confluens</i> , CS: 7, 'Notable').									
040-PS2-154001	Pond near River Blythe SSSI. Small, temporary, rectangular and shallow pond (approx. 50m ²) near to River Blythe SSSI that contained very little water at the time of the survey and is likely to dry up periodically. Pond supports low numbers of wetland plant species and invertebrate taxa (6 BMWP/PSYM taxa).	2	10	0	3.2	0	2	Very poor	23	Within land required
040-PS2-154002	Pond near River Blythe SSSI. Small, rectangular, shallow pond (60m ²) in River Blythe floodplain. Pond supports moderate numbers of wetland plant species and invertebrate taxa (13 BMWP/PSYM taxa, 22 species recorded).	8	9.0	1	4.0	0	2	Moderate	23	Within land required
040-PS2-	Pond near River Blythe SSSI. Shallow, small, rectangular pond (approx. 50m ²) in River	4	8.5	0	4.5	2	1	Moderate	23	Within land

Ecology survey code	Pond description	Plants			Invertebrates			General Quality Assessment (GQA)	CFA	Distance from land required for the construction of the Proposed Scheme ¹⁴⁹ (m) and orientation
		Number of submerged and emergent plant species	Trophic ranking score for aquatic and emergence plants	Number of uncommon plant species	Average score per taxon	Number of dragonfly (Odonata) and alderfly (Megaloptera) families	Number of beetle families			
154003	Blythe floodplain. Pond supports low numbers of wetland plant species and a moderate diversity of invertebrate taxa (11 BMWP/PSYM taxa), including Odonata and Coleoptera.									required
040-PS2-154004	Pond near River Blythe SSSI. Small, shallow, rectangular pond (approx. 65m ²) in River Blythe SSSI floodplain. Pond supports low numbers of wetland plant species and moderate numbers of invertebrate taxa (10 BMWP/PSYM taxa), including Odonata and Coleoptera.	6	9.25	0	4.4	2	1	Moderate	23	Within land required
040-PS2-156001	Large pond (1,840m ²) on course of Hollywell Brook. Pond supports moderately high numbers of plant species, including two species considered as being of 'Local' importance: flowering rush (<i>Butomus umbellatus</i>) and water dock (<i>Rumex hydrolapathum</i>). Pond also supports moderate numbers of invertebrate taxa (14 BMWP/PSYM taxa, 25 species), including the true bug (<i>Micronecta scholzi</i>) CS 6).	23	8.93	2	4.1	1	1	Moderate	24	Within land required
040-PS2-	Large pool/lake (approx. 66,000m ²), with Canadian geese population and moderately	20	8.64	3	4.31	1	1	Moderate	24	Within land

Ecology survey code	Pond description	Plants			Invertebrates			General Quality Assessment (GQA)	CFA	Distance from land required for the construction of the Proposed Scheme ¹⁴⁹ (m) and orientation
		Number of submerged and emergent plant species	Trophic ranking score for aquatic and emergence plants	Number of uncommon plant species	Average score per taxon	Number of dragonfly (Odonata) and alderfly (Megaloptera) families	Number of beetle families			
156002	diverse macrophyte community, including sea club rush (<i>Bolboschoenus maritimus</i>), water dock (<i>Rumex hydrolapathum</i>) and greater tussock-sedge. Moderate diversity of invertebrates (14 BMWP/PSYM taxa), including pollution sensitive caddis and mayfly larvae.									required
040-PS2-156003	Shaded pond in depression within pasture field/meadow in woodland. Pond supports low numbers of plant species and invertebrate taxa (5 BMWP/PSYM taxa, 8 species).	0	9.0	0	3.4	0	2	Very poor	24	Within land required
040-PS2-156004	Small wet patch within tree-shaded depression. Pond supports low numbers of plant species (duckweed only) and invertebrate taxa (5 BMWP/PSYM taxa, 8 species).	3	9.0	0	3.5	0	1	Very poor	24	Within land required
040-PS2-	Land west of Denbigh Spinney LWS. 3 connected ponds on historic ditch line (approx. 350m ²). Pond mostly overhung	3	9.0	0	4.6	3	2	Moderate	24	Within land required

Ecology survey code	Pond description	Plants			Invertebrates			General Quality Assessment (GQA)	CFA	Distance from land required for the construction of the Proposed Scheme ¹⁴⁹ (m) and orientation
		Number of submerged and emergent plant species	Trophic ranking score for aquatic and emergence plants	Number of uncommon plant species	Average score per taxon	Number of dragonfly (Odonata) and alderfly (Megaloptera) families	Number of beetle families			
157001	with low diversity aquatic and marginal vegetation. Invertebrate diversity relatively high (14 BMWP/PSYM taxa), including several Odonata and Coleoptera. In addition, species level invertebrate identification was undertaken on this pond (due to relatively high diversity), which did not identify any notable species.									
040-PS2-157002	Land west of Denbigh Spinney LWS Track. Small, vegetated pond (approx. 100m ²) in Moderately diverse vegetation, including two species considered as being of 'Local' importance: various-leaved water starwort (<i>Callitriche platycarpa</i>) and common club-rush. Pond supports moderate numbers of invertebrate taxa (10 BWMP/PSYM taxa), including Coleoptera and Odonata.	13	8.65	2	4.3	1	2	Moderate	24	Within land required
040-PS2-157003	Land west of Denbigh Spinney LWS. Small pond (approx. 40m ²), supporting low numbers of plants species, including common club-rush, categorised as 'Local' in terms of its rarity status. Invertebrate diversity low (7 BMWP/PSYM taxa).	4	8.4	1	4.0	1	1	Moderate	24	Within land required

Ecology survey code	Pond description	Plants			Invertebrates			General Quality Assessment (GQA)	CFA	Distance from land required for the construction of the Proposed Scheme ¹⁴⁹ (m) and orientation
		Number of submerged and emergent plant species	Trophic ranking score for aquatic and emergence plants	Number of uncommon plant species	Average score per taxon	Number of dragonfly (Odonata) and alderfly (Megaloptera) families	Number of beetle families			
040-PS2-157004	Land west of Denbigh Spinney LWS. Small, vegetated pond (approx. 50m ²). Moderate numbers of plant species, including stonewort (<i>Chara</i> sp.), categorised as 'Local' in terms of its rarity status. Moderate numbers of invertebrate taxa (11 BWMP/PSYM taxa), including Coleoptera and Odonata.	13	8.6	1	4.5	2	3	Moderate (borderline good)	25	Within land required
040-PS2-157005	Land west of Denbigh Spinney LWS'. Small, vegetated pond (approx. 50m ²). Moderate numbers of plant species, including plicate sweet-grass (<i>Glyceria notata</i>) and stonewort (<i>Chara</i> sp.) categorised as 'Local' in terms of its rarity status and moderate invertebrate richness (12 BWMP/PSYM taxa), including Coleoptera and Odonata.	14	8.5	2	4.3	2	3	Good	24	Within land required
040-PS2-157006	Land west of Denbigh Spinney LWS. Small pond (approx. 50m ²). Moderate numbers of plant species, including plicate sweet-grass (<i>Glyceria notata</i>), categorised as 'Local' in terms of its rarity status, and low numbers	13	8.84	1	4.4	1	2	Moderate	24	Within land required

Ecology survey code	Pond description	Plants			Invertebrates			General Quality Assessment (GQA)	CFA	Distance from land required for the construction of the Proposed Scheme ¹⁴⁹ (m) and orientation
		Number of submerged and emergent plant species	Trophic ranking score for aquatic and emergence plants	Number of uncommon plant species	Average score per taxon	Number of dragonfly (Odonata) and alderfly (Megaloptera) families	Number of beetle families			
	of invertebrate families (5 BWMP/PSYM taxa), including Coleoptera and Odonata. However, further invertebrate analysis identified notable species of diving beetle <i>Rhantus suturalis</i> (CS: 7, 'Notable') and <i>Hygrotus impressopunctatus</i> (CS: 5, 'Local').									
040-PS2-157007	Land west of Denbigh Spinney LWS Small, vegetated pond (approx. 50m ²). Moderate numbers of plant species, including plicate sweet-grass (<i>G.notata</i>), common water-crowfoot (<i>Ranunculus aquatilis</i>) and stonewort (<i>Chara sp.</i>), categorised as 'Local' in terms of rarity status, and moderate invertebrate richness (13 BWMP/PSYM taxa), including Coleoptera and Odonata. Further invertebrate analysis identified 4 species of Odonata, including <i>Libellula depressa</i> and <i>Sympetrum sanguineum</i> (CS: 5, 'Local') and 7 species of water beetle including the diving beetle, <i>Rhantus suturalis</i> (CS: 7, 'Notable').	16	8.75	3	4.4	2	3	Good	24	Within land required
040-PS2-157008	Land west of Denbigh Spinney LWS. Small/moderate sized, vegetated pond (approx. 200m ²). Moderate numbers of plant species, including plicate sweet-grass	11	8.6	3	4.7	2	4	Good	24	Within land required

Ecology survey code	Pond description	Plants			Invertebrates			General Quality Assessment (GQA)	CFA	Distance from land required for the construction of the Proposed Scheme ¹⁴⁹ (m) and orientation
		Number of submerged and emergent plant species	Trophic ranking score for aquatic and emergence plants	Number of uncommon plant species	Average score per taxon	Number of dragonfly (Odonata) and alderfly (Megaloptera) families	Number of beetle families			
	(<i>Glyceria notata</i>), common water-crowfoot (<i>Ranunculus aquatilis</i>) and stonewort (<i>Chara sp.</i>), categorised as 'Local' in terms of rarity status, and moderate invertebrate richness (14 BWMP/PSYM taxa), including Coleoptera and Odonata.									
040-PS2-158001	Small, spherical pond (120m ²), heavily shaded, on margin of woodland and near arable field. Very little aquatic vegetation and low numbers of invertebrate taxa (6 BMWP/PSYM families).	2	8.15	0	3.8	0	2	Poor	24	Within land required
040-PS2-159001	Large ovoid pond (approx. 1,140m ²) in arable fields, surrounded by trees and sometimes used by anglers. Water turbid. Marginal and aquatic vegetation and habitat varied. Pond supports moderate numbers of plants species and macro-invertebrate taxa (14 BMWP/PSYM families), with the presence of pollution sensitive caddis, Odonata and mayfly species.	7	9.3	0	4.7	3	0	Moderate	24	Within land required

Ecology survey code	Pond description	Plants			Invertebrates			General Quality Assessment (GQA)	CFA	Distance from land required for the construction of the Proposed Scheme ¹⁴⁹ (m) and orientation
		Number of submerged and emergent plant species	Trophic ranking score for aquatic and emergence plants	Number of uncommon plant species	Average score per taxon	Number of dragonfly (Odonata) and alderfly (Megaloptera) families	Number of beetle families			
040-PS2-159002	Moderate sized pond (300m ²) near to footpath and surrounded by arable fields. At time of survey trees had recently been cut, therefore until recently it had been heavily shaded and there was very little aquatic and marginal vegetation but some green algae on the surface. Invertebrate taxa diversity low (3 BMWP/PSYM scoring taxa) and indicative of poor water quality.	1	N/A	0	3.0	0	0	Poor	24	Within land required
040-PS2-159003	Large ovoid pond (approx. 400m ²), shaded by trees in most areas, but with some aquatic and marginal vegetation. Pond supports moderate numbers of invertebrate taxa (9 BMWP/PSYM scoring taxa).	6	9.38	0	3.9	0	2	Very poor	24	Within land required
040-PS2-165001	Large (approx. 450m ²) deep permanent pond within grassland/woodland area, entirely covered in water fern (<i>Azolla filiculoides</i>), with little other aquatic vegetation and a deep anoxic silt rich base. Low/ moderate invertebrate diversity (7 BWMP/ PSYM families, 11 species).	3	8.5	0	3.7	0	2	Poor	25	Within land required
040-PS2-	Moderate sized pond (300m ²) within grassland/pasture. High duckweed cover, low plant and moderate invertebrate	2	8.83	0	4.5	1	1	Poor	25	Within land required

Ecology survey code	Pond description	Plants			Invertebrates			General Quality Assessment (GQA)	CFA	Distance from land required for the construction of the Proposed Scheme ¹⁴⁹ (m) and orientation
		Number of submerged and emergent plant species	Trophic ranking score for aquatic and emergence plants	Number of uncommon plant species	Average score per taxon	Number of dragonfly (Odonata) and alderfly (Megaloptera) families	Number of beetle families			
166001	diversity (6 BWMP/PSYM families, 20 species).									
040-PS2-166002	Large pond/lake (approx. 19,000m ²) within grassland/ woodland area. Moderate numbers of plant species, including nodding bur-marigold and small pondweed (<i>Potamogeton berchtoldii</i>) (Local rarity status). Moderate invertebrate family and species richness (12 BWMP/PSYM families, 19 species).	8	8.9	2	3.3	0	1	XXX	25	Within land required
040-PS2-166003	A pond within marshland (approx. 250m ²). Moderate plant diversity (substantial duckweed cover) and invertebrate diversity (11 BWMP/ PSYM families, 17 species).	6	8.66	0	3.4	0	1	Poor	25	Within land required
040-PS2-166004	Small, shallow pond (approx. 200m ²), with low vegetation cover/ diversity, recently constructed and grazed. High invertebrate diversity (8 BWMP/ PSYM families, 35 species, based on the two surveys completed to date), including notable diving	3	8.75	0	4.0	0	2	Poor	25	Within land required

Ecology survey code	Pond description	Plants			Invertebrates			General Quality Assessment (GQA)	CFA	Distance from land required for the construction of the Proposed Scheme ¹⁴⁹ (m) and orientation
		Number of submerged and emergent plant species	Trophic ranking score for aquatic and emergence plants	Number of uncommon plant species	Average score per taxon	Number of dragonfly (Odonata) and alderfly (Megaloptera) families	Number of beetle families			
	beetle (<i>Hydroglyphus geminus</i> and <i>Hygrotus confluens</i> CS: 7 'Notable', <i>Hygrotus impressopunctatus</i> , CS 5 'Local'; <i>Hygrotus nigrolineatus</i> CS: 8).									
040-PS2-166005	Recently established small and shallow pond (approx. 300m ²) in grassland/ pasture, grazed by cattle. Low numbers of plant species, including locally important stonewort (<i>Chara sp.</i>) and high invertebrate richness (8 BWMP/ PSYM families, 40 species, based on two surveys completed), including notable species of diving beetle (<i>Hygrotus impressopunctatus</i> , CS: 5 'Local'; <i>Hygrotus confluens</i> CS: 7, <i>Hygrotus nigrolineatus</i> , CS: 8, rare (now considered as 'nationally scarce').	8	9.23	1	4.0	0	1	Poor	25	Within land required
040-PS2-166006	A small shallow and vegetated pond (approx. 200m ²) within grassland/pasture field. Low numbers of plant species, including pink water-speedwell, categorised as 'Local' in terms of rarity status, and moderate invertebrate family level richness (9 BWMP/PSYM taxa). Further analysis showed that invertebrate species diversity was high (34 species, based on the two	12	9.30	1	4.0	1	3	Moderate	25	Within land required

Ecology survey code	Pond description	Plants			Invertebrates			General Quality Assessment (GQA)	CFA	Distance from land required for the construction of the Proposed Scheme ¹⁴⁹ (m) and orientation
		Number of submerged and emergent plant species	Trophic ranking score for aquatic and emergence plants	Number of uncommon plant species	Average score per taxon	Number of dragonfly (Odonata) and alderfly (Megaloptera) families	Number of beetle families			
	surveys completed to date) and included the diving beetle (<i>Hygrotus impressopunctatus</i>) (CS: 5, 'Local').									
040-PS2-166007	A recently constructed ponded ditch (approx. 140m ² , considered/assessed as a pond) in a grazed pasture field. The pond comprises two separate ditches and is not vegetated. Invertebrate diversity was moderate at family level but high at species level (10 BWMP/PSYM families, 41 species, based on two surveys) and included notable species of diving beetle (<i>Hydroglyphus geminus</i> , <i>Rhantus suturalis</i> , CS: 7 'Notable' <i>Hygrotus impressopunctatus</i> , CS: 5 'Local').	3	8.5	0	4.6	1	2	Poor	25	Within land required
040-PS2-166008	Ephemeral pond under Pylon, a small, shallow and vegetated pond (approx. 180m ²) within grassland/pasture field. Low numbers of plant species, including pink water-speedwell, categorised as 'Local' in terms of rarity status, and moderate invertebrate family level richness (nine	8	8.75	1	4.4	1	2	Moderate	25	Within land required

Ecology survey code	Pond description	Plants			Invertebrates			General Quality Assessment (GQA)	CFA	Distance from land required for the construction of the Proposed Scheme ¹⁴⁹ (m) and orientation
		Number of submerged and emergent plant species	Trophic ranking score for aquatic and emergence plants	Number of uncommon plant species	Average score per taxon	Number of dragonfly (Odonata) and alderfly (Megaloptera) families	Number of beetle families			
	BWMP/PSYM taxa). Species level identification showed that invertebrate species diversity was higher (27 species) and included the greater water boatmen (<i>Notonecta marmorea viridis</i>) and a diving beetle (<i>Hygrotus impressopunctatus</i>) (CS: 5, 'Local').									
040-PS2-166009	A recently constructed, small (approx. 40m ²), ponded ditch (considered/assessed as a pond) in pasture field and near to woodland. Plant and invertebrate diversity low (five BWMP/PSYM families, 11 species).	0	N/A	0	4.2	0	2	Very poor	25	Within land required
040-PS2-167001	A recently established and shallow pond (approx. 200m ²), grazed by cattle. Low vegetation cover/ diversity and moderate to high invertebrate diversity (six BWMP/PSYM families, 27 species), including notable diving beetle (<i>Hydroglyphus geminus</i> , <i>Hygrotus confluens</i> CS: 7 'Notable', <i>Hygrotus nigrolineatus</i> CS: 8).	4	10	0	4.3	0	2	Poor	25	Within land required
040-PS2-167002	A small and shallow pond (approx. 150m ²) that appears to have been recently established within grassland/pasture field. Low vegetation diversity and moderate	5	7.9	1	4.4	0	3	Moderate	25	Within land required

Ecology survey code	Pond description	Plants			Invertebrates			General Quality Assessment (GQA)	CFA	Distance from land required for the construction of the Proposed Scheme ¹⁴⁹ (m) and orientation
		Number of submerged and emergent plant species	Trophic ranking score for aquatic and emergence plants	Number of uncommon plant species	Average score per taxon	Number of dragonfly (Odonata) and alderfly (Megaloptera) families	Number of beetle families			
	invertebrate taxa diversity (seven BWMP/PSYM families, 29 species, based on the two surveys completed to date), including notable species of diving beetle (<i>Hydroglyphus geminus</i> , <i>Hygrotus confluens</i> CS: 7, 'Notable' and <i>Hygrotus nigrolineatus</i> CS: 8).									
040-PS2-167003	Moderately large pond formed by outfall from M6, pond (approx. 400m ²) within grassland/pasture. Poor apparent quality, receiving surface water from M6 runoff. Low plant diversity and low/moderate invertebrate diversity (eight BMWP/PSYM families, 12 species).	4	9.5	0	3.2	0	0	Very poor	25	Within land required
040-PS2-173001	Grand Union Canal SLINC. Low invertebrate species diversity (four BMWP/PSYM families, five species), with common and pollution tolerant groups only. Plants not assessed by PSYM canal survey method.	Not assessed	Not assessed	Not assessed	2.3	0	0	Not assessed	26	Within land required

Ecology survey code	Pond description	Plants			Invertebrates			General Quality Assessment (GQA)	CFA	Distance from land required for the construction of the Proposed Scheme ¹⁴⁹ (m) and orientation
		Number of submerged and emergent plant species	Trophic ranking score for aquatic and emergence plants	Number of uncommon plant species	Average score per taxon	Number of dragonfly (Odonata) and alderfly (Megaloptera) families	Number of beetle families			
040-PS2-174001	Digbeth Branch Canal SLINC. Moderate/high invertebrate diversity (14 BMWP/ PSYM families, 25 species) including one species of damselfly, three species of Heteroptera and six species of caddis larvae (including <i>Cyrtus flavidus</i> CS: 5, 'local'). Plants not assessed by PSYM canal survey method.	Not assessed	Not assessed	Not assessed	5.0	5	0	Not assessed	26	Within land required

National pond survey (NPS)

- 10.4.5 Results for NPS surveys can be found in Table 66 (040-PS3-148001), Table 67 (040-PS3-153001), Table 68 (040-PS3-153002), Table 69 (040-PS3-159001), Table 70 (040-PS3-165001) and Table 71 (040-PS3-165002).
- 10.4.6 Water body 040-PS3-148001 was a large and permanent pond with a vegetated central island located in a pasture field, surrounded mainly by semi-improved grassland and hedges. There was a diverse macrophyte community, including emergent plants water plantain (*Alisma plantago-aquatica*), yellow iris, soft-rush, creeping buttercup (*Ranunculus repens*), jointed rush (*Juncus articulatus*), bulrush (*Typha latifolia*), great willowherb, reed canary-grass, brooklime, a forget-me not species and creeping bent. Floating leaved plants included broad-leaved pondweed (*Potamogeton natans*), white water-lily (*Nymphaea alba*) and curly waterweed (*Lagarosiphon major*). Nuttall's waterweed and New Zealand pigmyweed, both non-native invasive plant species, were also present. The pond had a moderately diverse invertebrate fauna with 52 species recorded over three surveys, including the notable (conservation score 7) diving beetles *Ilybius fenestratus*, *Hydroglyphus geminus*, *Rhantus suturalis* and *Helochares lividus*, as well as the Local (conservation score 5) lesser water boatman (*Sigara limitata*), snail (*Anisus leucostoma*), mayfly (*Caenis robusta*), water stick insect (*Ranatra linearis*), emperor dragonfly (*Anax imperator*) and black-tailed skimmer (*Orthetrum cancellatum*).

Table 66: Survey Results for NPS on water body 040-PS3-148001

Unique Reference Code	040-PS3-148001				
Surveyor	NG, GE, NW and JB		Date	13 September 2012 14 August 2012 09 July 2013	
8 Digit GPS Co-ordinates	SP 25319 77129		Survey duration	1hr. 2hrs.	
Weather conditions					
POND AREA					
Pond area (m²)	2,200		Water area (m²)	2,000	
Max length (m)	76		Max width (m)	35	
Marginal complexity	2	Rank the complexity of the margins on a scale of 1 to 10			
1= very simple i.e. circle, 2= 10% greater length of margin (i.e. square not circle), 4= length c. double bank length that pond would be if circle, 7= five times length of bank, 10= pool with impossibly convoluted margin and/or many islands					
SEASONAL WATER LEVEL FLUCTUATION AND PERMANENCE					
Drawdown height (cm)	20	i.e. the difference between maximum and current water levels			
Permanence	1/2	Pond dries: 1= never, 2= rarely, 3= sometimes, 4= annually			
If the pond dries, how much probably dries to a hard base?				N/A	%
If the pond dries, how much probably dries to soft sediment?				N/A	%
OVERHANGING TREES AND SHRUBS					
Pond overhung	0	%	Water overhung	0	%
Total pond margin overhung	0	%	Water margin overhung	0	%
SURROUNDING LAND USE					
Estimate the percentage of surrounding land use within the following zones.					

LAND-USE	Less than 5m	0-100m	Surface water catchment
Deciduous trees and Woodland	5	15	5
Coniferous trees and Woodland			
Scrub/Hedge	10	5	5
Moor/Lowland Heath			
Bog			
Fen/Marsh			
Rank Vegetation			
Unimproved grassland			
Semi-improved grassland	85	60	80
Improved grassland			
Arable		10	10
Gardens and Parks			
Buildings and concrete			Less than 5
Roads			Less than 5
Paths and tracks	Less than 5	5	Less than 5
rock, stone, gravel			
Ponds and lakes			
Streams, ditches etc.		5	Less than 5
Other			
Is the pond located in an area protected for nature conservation (e.g. reserve)?			NO
If so, what type? (e.g. SSSI)			
SIZE OF SURFACEWATER CATCHMENT			
Size of surface water catchment (1-5)		3	
5= very large, more than 100,000m ² (more than 100m x 1000m); 4= large, 10,000m ² to 100,000m ² (less than 100m x 1000m); 3= moderate, 1,000m ² to 10,000m ² (less than 100m x 100m); 2= small, 100m ² to 1,000m ² (less than 10 x 100m); 1= tiny, less than 100m ² (=10 x 10m)			

OTHER ADJACENT WETLANDS AND WATER BODIES					
Is the pond located on or near to a stream or river floodplain? Rank 0 - 3					0
Is the pond located in a traditionally watery or wetland area? Rank 0 - 3					0
How isolated is the water body? Rank 0 - 5					3
WATER SOURCE					
Estimate the importance of the following water sources					%
Groundwater/water table					0
Spring (less than 25m long)					0
Flood water					0
Runoff and near surface water					80
Stream or ditch					5
Flush					0
Direct precipitation					15
Others (Land drains etc.)					0
SEDIMENT AND WATER DEPTHS					
	Transect A (longest dimension)			Transect B (right angles to A)	
	A1	A2	A3	B1	B2
Water depths (cm)	more than 100	more than 100	more than 100		
Silt depths (cm)	20	15	20		
Total depth (silt and water)(cm)	more than 100	more than 100	more than 100		
GEOLOGY					
			Rock Type	Percentage (%)	

Predominant rock type in geology of pond					
Predominant rock type in geology of catchment					
Nature of pond base		Sediment			
Approximate % of the following:		Approximate % of the following:			
Clay/silt	50	Decomposing leaves and twigs		20	
Butyl/concrete/ synthetic	0	Coarse organic debris (c.o.05m-10mm diameter)		0	
Stone blocks	0	Ooze (i.e. non-particulate)		40	
Sand	20	Sand (often stream-borne)		20	
Gravel	20	Gravel (often stream-borne)		10	
Pebbles and rocks	10	Pebbles and rocks		10	
Bed rock	0	Peat		0	
Peat	0	Boulders/Blocks		0	
Others	0	Other		0	
INFLOWS AND OUTFLOWS					
Does the pond have any seasonal or permanent inflows or outflows?					
Inflows	0	Outflows		0	
If yes, estimate their average width and depth. Where possible note the flow rate. Where this is difficult, estimate the flow category: 1= dry at time of survey, 2= 0-10cm/sec, 3= 11-50cm/sec, 4= 51-200cm/sec, 5= more than 200cm/sec					
Inflow or outflow	Water width (cm) (if wet)		Water depth (cm)	Flow rate (cm/sec)	Flow category
N/A	N/A		N/A	N/A	N/A
BANK TYPE AND NATURALNESS					
		Min	Max	Av	
Bank angle to top of sediment only (over 1m from outer edge of pond) (°)		40	80	65	
Bank angle to base of pond (i.e. below sediment, (over 1m) (°)		20	30	25	
Water depth at edge (NB usually = 0cm) (cm)		0	0	0	
Bank type	%		%		
Natural Earth	100	Wood	0		
Concrete	0	Stone	0		
Metal Piling	0	Rock	0		
Spoil	0	Other	0		
	%				

Bare ground on upper banks:	Less than 5	Reason for bare ground: N/A	
Bare ground on drawdown area:	Less than 5	Reason for bare ground: N/A	
POND MANAGEMENT			
Livestock grazing			
Is the pond grazed by livestock?			Probably
If yes, which animals graze the pond?	Cattle	Possibly	
	Horses		
	Sheep		
	Other		
% pond margin grazed by livestock? N/A		% of pond grazed by livestock? N/A	
Rank the livestock grazing intensity for the pond as a whole			1
1= very light or periodic, 2= light, 3= moderate, 4= heavy, 5= very heavy			
DUCK AND WILDFOWL GRAZING			
Is there evidence of duck or wildfowl?			YES
Rank the duck and other wildfowl grazing intensity for the pond as a whole: 1/2			
1= very light or periodic, 2= light, 3= moderate, 4= heavy, 5= very heavy			
Notes about which duck/ wildfowl graze the pond, and how many? Also, describe any evidence of nesting.			
One Mallard duck observed moorhen and coot breeding, swan, geese use occasionally. Also used by swallows. 5 Canadian geese			
OTHER GRAZING			
Is the pond grazed by other animals (e.g. deer)? If yes, describe which animals and what % of the pond is grazed by other animals?			
Small mammals			
FISH			
Are there fish present in the pond?			YES
If yes, rank the fish impact for the pond as a whole :			
1= very light or periodic, 2= light, 3= moderate, 4= heavy, 5= very heavy			3
If yes, describe the fish and approximate numbers if known:			
unknown, likely estimate			
AMPHIBIANS			
Are amphibians present in the pond?			YES
If yes, record the list of species and approximate abundance if known:			
Smooth newt, common frog and common toad			

POND AGE AND HISTORY		
Rank age of pond as 1= 1-10yrs, 2= 11-100yrs., 3= 101-1000yrs, 4= more than 1000yrs.		
2 (approximately)		
What is the likely origin of the pond?		
Unknown		
AMENITY VALUE		
Is there a view of the pond from rights of way?	YES	
If yes, score each of the following on a five point scale (1= view almost obscured, 5= clearly visible)		
		Score (1-5)

Footpath	2		
Bridle Path			
A Road			
B Road			
Minor Road			
Open Public access	2 / 3		
Other Public access			
Private track, path or other access			
Is the pond located in an area of open public access?		YES	NO
FORMAL AMENITY USE			
Is there any evidence of formal amenity use?		YES	NO
If yes, please select 'yes' as appropriate:			
Fishing		(e.g. fishing platforms, pegs, swims, embankments)	
Shooting		(e.g. hides, blinds)	
Ornamental Fish		(e.g. Koi carp, goldfish)	
Ornamental wildfowl		(e.g. nesting boxes, feeders)	
Pond dipping		(e.g. dipping platforms, bird hides)	
Boating and other water sports		(e.g. boat/ boathouse)	
Model boating			
Other			
WATER QUALITY			
Conductivity ($\mu\text{S cm}^{-1}$)		168	
Calcium (mg l^{-1})		20.7	
Alkalinity (m mol^{-1})		65	
pH		7.8	
Temperature ($^{\circ}\text{C}$)		17.1	
Turbidity (1= clear, 2= moderately clear, 3= moderately turbid, 4= turbid)		2	
Secchi depth (cm)		50	
Water colour		clear	
Probable source of water colour			
Brown in some areas (due to substrate)			
SOURCES OF POLLUTION			
Is there any evidence of rubbish or other pollutants? (e.g. oils)			
No			
If yes, estimate the % of the pond affected:		%	
Type of pollutants present:			

Rank individual pollutant sources on a scale of 1-5 (1= little polluted or affected, 5= very polluted):			
		Score (1-5)	
Agricultural/Farming land use quality		1	
Urban areas			
Road runoff quality		1	
Stream and other inflows			
Ducks		1	
Fish		1	
Stock			
Litter			
Other			
Give an overall rating of the extent to which the pond is likely to be polluted (from 0= not polluted to 10= as bad as it can get):			
Describe any mitigating factors (e.g. buffering, groundwater inflows):			
Photograph taken	Yes	Photograph Unique Reference ¹	040-PS3-148001-P1-130912
Pond with island in centre			

- 10.4.7 Water body 040-PS3-153001 was a shallow vegetated pond with jointed rush, soft rush, gypsywort and buttercup species, and a diverse invertebrate fauna with 66 species recorded over three surveys, including the notable (conservation score 7) species of water beetles *Enochrus melanocephalus* and *Ilybius fenestratus* as well as the local (conservation score 5) water beetles *Acilius sulcatus* and *Hygrotus impressopunctatus*. Other notable species were also recorded, such as the emperor dragonfly and black-tailed skimmer, water boatman (*Notonecta marmorealis viridis*), the mayfly (*Caenis robusta*), the lesser water boatman (*Sigara scotti*), as well as the caddisflies *Leptocerus tineiformis* and *Agrypnia obsoleta*. In addition, the regionally notable (conservation score 6) snail (*Gyraulus laevis*) and the lesser water boatman (*Micronecta scholtzi*) were also recorded.

Table 67: Survey Results for NPS on water body 040-PS3-153001

Unique Reference Code	040-PS3-153001				
Surveyor	NG and GE		Date	05 September 2012	
8 Digit GPS Co-ordinates	SP 21799 80841		Survey duration	1hr.	
Weather conditions	sunny and warm				
POND AREA					
Pond area (m²)	2,700		Water area (m²)	26,500	
Max length (m)	100		Max width (m)	40	
Marginal complexity	5	Rank the complexity of the margins on a scale of 1 to 10			
1= very simple i.e. circle, 2= 10% greater length of margin (i.e. square not circle), 4= length c. double bank length that pond would be if circle, 7= five times length of bank, 10= pool with impossibly convoluted margin and/or many islands					
SEASONAL WATER LEVEL FLUCTUATION AND PERMANENCE					
Drawdown height (cm)		i.e. the difference between maximum and current water levels			
Permanence	1 or 2	Pond dries: 1= never, 2= rarely, 3= sometimes, 4= annually			
If the pond dries, how much probably dries to a hard base?				N/A	%
If the pond dries, how much probably dries to soft sediment?				N/A	%
OVERHANGING TREES AND SHRUBS					
Pond overhung	0	%	Water overhung	0	%
Total pond margin overhung	0	%	Water margin overhung	0	%
SURROUNDING LAND USE					
Estimate the percentage of surrounding land use within the following zones.					

LAND-USE	Less than 5m	0-100m	Surface water catchment
Deciduous trees and Woodland	5	10	10
Coniferous trees and Woodland			
Scrub/Hedge	5	10	10
Moor/Lowland Heath			
Bog			
Fen/Marsh			
Rank Vegetation			
Unimproved grassland			
Semi-improved grassland	80	70	70
Improved grassland			
Arable			
Gardens and Parks			
Buildings and concrete			
Roads			
Paths and tracks	10	5	5
rock, stone, gravel			
Ponds and lakes			
Streams, ditches etc.			
Other		5	5
Is the pond located in an area protected for nature conservation (e.g. reserve)?			YES
If so, what type? (e.g. SSSI)		Marsh Lane Nature Reserve	
SIZE OF SURFACEWATER CATCHMENT			
Size of surface water catchment (1-5)		3 or 4	
5= very large, more than 100,000m ² (more than 100m x 1000m); 4= large, 10,000m ² -100,000m ² (less than 100m x 1000m); 3= moderate, 1,000m ² -10,000m ² (less than 100m x 100m); 2= small, 100m ² -1,000m ² (less than 10 x 100m); 1= tiny, less than 100m ² (=10 x 10m)			

OTHER ADJACENT WETLANDS AND WATER BODIES					
Is the pond located on or near to a stream or river floodplain? Rank 0 - 3					1
Is the pond located in a traditionally watery or wetland area? Rank 0 - 3					1
How isolated is the water body? Rank 0 - 5					2 or 3
WATER SOURCE					
Estimate the importance of the following water sources					%
Groundwater/water table					
Spring (less than 25m long)					
Flood water					10
Runoff and near surface water					
Stream or ditch					50
Flush					
Direct precipitation					10
Others (Land drains etc.)					
SEDIMENT AND WATER DEPTHS					
	Transect A (longest dimension)			Transect B (right angles to A)	
	A1	A2	A3	B1	B2
Water depths (cm)	110	80	140	150	
Silt depths (cm)	5	5	10	10	
Total depth (silt and water)(cm)	120	90	150	160	
GEOLOGY					
			Rock Type	Percentage (%)	
Predominant rock type in geology of pond					
Predominant rock type in geology of catchment					
Nature of pond base		Sediment			
Approximate % of the following:		Approximate % of the following:			
Clay/silt	80	Decomposing leaves and twigs		20	
Butyl/concrete/ synthetic		Coarse organic debris (c.o.05m-10mm diameter)		20	
Stone blocks		Ooze (i.e. non-particulate)		50	
Sand	10	Sand (often stream-borne)			
Gravel	10	Gravel (often stream-borne)		10	
Pebbles and rocks		Pebbles and rocks			
Bed rock		Peat			
Peat		Boulders/Blocks			
Others		Other			

INFLOWS AND OUTFLOWS				
Does the pond have any seasonal or permanent inflows or outflows?				
Inflows	0	Outflows	1	
If yes, estimate their average width and depth. Where possible note the flow rate. Where this is difficult, estimate the flow category: 1= dry at time of survey, 2= 0-10cm/sec, 3= 11-50cm/sec, 4= 51-200cm/sec, 5= more than 200cm/sec				
Inflow or outflow	Water width (cm) (if wet)	Water depth (cm)	Flow rate (cm/sec)	Flow category
Outflow	1	1	1	1
BANK TYPE AND NATURALNESS				
		Min	Max	Av
Bank angle to top of sediment only (over 1m from outer edge of pond) (°)		40	60	50
Bank angle to base of pond (i.e. below sediment, (over 1m) (°)		20	30	25
Water depth at edge (NB usually = 0cm) (cm)		0		
Bank type	%		%	
Natural Earth	100	Wood		
Concrete		Stone		
Metal Piling		Rock		
Spoil		Other		
	%			
Bare ground on upper banks:	0	Reason for bare ground:		
Bare ground on drawdown area:	0	Reason for bare ground:		
POND MANAGEMENT				
Livestock grazing				
Is the pond grazed by livestock?				YES
If yes, which animals graze the pond?			Cattle	Yes
			Horses	
			Sheep	
			Other	
% pond margin grazed by livestock	100%	% of pond grazed by livestock?		10%
Rank the livestock grazing intensity for the pond as a whole				5
1= very light or periodic, 2= light, 3= moderate, 4= heavy, 5= very heavy				

DUCK AND WILDFOWL GRAZING			
Is there evidence of duck or wildfowl?			NO
Rank the duck and other wildfowl grazing intensity for the pond as a whole: 1= very light or periodic, 2= light, 3= moderate, 4= heavy, 5= very heavy			
Notes about which duck/ wildfowl graze the pond, and how many? Also, describe any evidence of nesting.			
Water birds use nearby ponds in the Nature Reserve			
OTHER GRAZING			
Is the pond grazed by other animals (e.g. deer)? If yes, describe which animals and what % of the pond is grazed by other animals?			
No			
FISH			
Are there fish present in the pond?			Unknown
If yes, rank the fish impact for the pond as a whole :			
1= very light or periodic, 2= light, 3= moderate, 4= heavy, 5= very heavy			
If yes, describe the fish and approximate numbers if known:			
Unknown			
AMPHIBIANS			
Are amphibians present in the pond?		Unknown	
If yes, record the list of species and approximate abundance if known:			
Unknown			
POND AGE AND HISTORY			
Rank age of pond as 1= 1-10yrs, 2= 11-100 yrs., 3= 101-1000yrs, 4= more than 1000yrs.			
2			
What is the likely origin of the pond?			
Unknown			

AMENITY VALUE					
Is there a view of the pond from rights of way?				YES	
If yes, score each of the following on a five point scale (1= view almost obscured, 5= clearly visible)					
		Score (1-5)			
Footpath		2			
Bridle Path					
A Road					
B Road					
Minor Road					
Open Public access					
Other Public access					
Private track, path or other access		2			
Is the pond located in an area of open public access?					NO
FORMAL AMENITY USE					
Is there any evidence of formal amenity use?				YES	
If yes, please select 'yes' as appropriate:					
Fishing		(e.g. fishing platforms, pegs, swims, embankments)			
Shooting		(e.g. hides, blinds)			
Ornamental Fish		(e.g. Koi carp, goldfish)			
Ornamental wildfowl		(e.g. nesting boxes, feeders)			
Pond dipping		(e.g. dipping platforms, bird hides)			
Boating and other water sports		(e.g. boat/ boathouse)			
Model boating					
Other Birds watching					
WATER QUALITY					
Conductivity ($\mu\text{S cm}^{-1}$)				297	
Calcium (mg l^{-1})				20.4	
Alkalinity (m mol^{-1})				115	
pH				9.22	
Temperature ($^{\circ}\text{C}$)				15	
Turbidity (1= clear, 2= moderately clear, 3= moderately turbid, 4= turbid)				2	
Secchi depth (cm)				100	
Water colour				clear	
Probable source of water colour					
SOURCES OF POLLUTION					
Is there any evidence of rubbish or other pollutants? (e.g. oils)					
No					

If yes, estimate the % of the pond affected:		%	
Type of pollutants present:			
Rank individual pollutant sources on a scale of 1-5 (1= little polluted or affected, 5= very polluted):			
		Score (1-5)	
Agricultural/Farming land use quality		0	
Urban areas		0	
Road runoff quality		0	
Stream and other inflows		1 or 2	
Ducks		1	
Fish		1	
Stock		0	
Litter		0	
Other		0	
Give an overall rating of the extent to which the pond is likely to be polluted (from 0= not polluted to 10= as bad as it can get):			
Describe any mitigating factors (e.g. buffering, groundwater inflows):			
Photograph taken	Yes	Photograph Unique Reference ¹	040-PS-153001-P1-050912 040-PS-153001-P2-050912 040-PS3-153001-P3-090713 040-PS3-153001-P3-090713
Pond with diverse invertebrate community			

- 10.4.8 Water body 040-PS3-153002 had a rich floral diversity supporting great pond-sedge (*Carex riparia*), common spike-rush (*Eleocharis palustris*), great willowherb, yellow iris, marsh bedstraw (*Galium palustre*), jointed rush, soft rush, bird's-foot-trefoil, gypsywort, purple-loosestrife (*Lythrum salicaria*), water mint, water forget-me-not (*Myosotis scorpioides*), common club-rush, branched bur-reed, bulrush and thistle species. The invertebrate diversity was exceptionally high with 46 species present in a single survey, including the local (conservation score 5) caddisfly (*Phryganea grandis*) and emperor dragonfly.

Table 68: Survey Results for NPS on water body 040-PS3-153002

Unique Reference Code	040-PS3-153002				
Surveyor	NG and GE		Date	06 September 2012	
8 Digit GPS Co-ordinates	SP21767		Survey duration	40 minutes	
Weather conditions	warm and sunny				
POND AREA					
Pond area (m²)	700m ²		Water area (m²)	680m ²	
Max length (m)	40m		Max width (m)	20m	
Marginal complexity	3	Rank the complexity of the margins on a scale of 1 to 10			
1= very simple i.e. circle, 2= 10% greater length of margin (i.e. square not circle), 4= length c. double bank length that pond would be if circle, 7= five times length of bank, 10= pool with impossibly convoluted margin and/or many islands					
SEASONAL WATER LEVEL FLUCTUATION AND PERMANENCE					
Drawdown height (cm)	3	i.e. the difference between maximum and current water levels			
Permanence	1	Pond dries: 1= never, 2= rarely, 3= sometimes, 4= annually			
If the pond dries, how much probably dries to a hard base?					%
If the pond dries, how much probably dries to soft sediment?					%
OVERHANGING TREES AND SHRUBS					
Pond overhung	Less than 5	%	Water overhung	Less than 5	%
Total pond margin overhung	Less than 5	%	Water margin overhung	Less than 5	%
SURROUNDING LAND USE					
Estimate the percentage of surrounding land use within the following zones.					

LAND-USE	Less than 5m	0-100m	Surface water catchment
Deciduous trees and Woodland		10	10
Coniferous trees and Woodland			
Scrub/Hedge	20	10	10
Moor/Lowland Heath			
Bog			
Fen/Marsh			
Rank Vegetation			
Unimproved grassland			
Semi-improved grassland	80	65	65
Improved grassland			
Arable			
Gardens and Parks			
Buildings and concrete			
Roads			
Paths and tracks		55	55
rock, stone, gravel			
Ponds and lakes		5	5
Streams, ditches etc.		5	5
Other			
Is the pond located in an area protected for nature conservation (e.g. reserve)?			YES
If so, what type? (e.g. SSSI) Marsh Lane Nature Reserve			
SIZE OF SURFACEWATER CATCHMENT			
Size of surface water catchment (1-5)		3	
5= very large, more than 100,000m ² (more than 100m x 1000m); 4= large, 10,000m ² -100,000m ² (less than 100m x 1000m); 3= moderate, 1,000m ² -10,000m ² (less than 100m x 100m); 2= small, 100m ² -1,000m ² (less than 10 x 100m); 1= tiny, less than 100m ² (=10 x 10m)			

OTHER ADJACENT WETLANDS AND WATER BODIES					
Is the pond located on or near to a stream or river floodplain? Rank 0 - 3					1
Is the pond located in a traditionally watery or wetland area? Rank 0 - 3					2
How isolated is the water body? Rank 0 - 5					0
WATER SOURCE					
Estimate the importance of the following water sources					%
Groundwater/water table					
Spring (less than 25m long)					
Flood water					
Runoff and near surface water					15
Stream or ditch					
Flush					10
Direct precipitation					15
Others (Land drains etc.)					
SEDIMENT AND WATER DEPTHS					
	Transect A (longest dimension)			Transect B (right angles to A)	
	A1	A2	A3	B1	B2
Water depths (cm)	more than 1.2	more than 1.2	more than 1.2		
Silt depths (cm)	0.1	0.1	0.1		
Total depth (silt and water)(cm)	more than 1.2	more than 1.2	more than 1.2		
GEOLOGY					
			Rock Type	Percentage (%)	
Predominant rock type in geology of pond					
Predominant rock type in geology of catchment					
Nature of pond base		Sediment			
Approximate % of the following:		Approximate % of the following:			
Clay/silt	70	Decomposing leaves and twigs		30	
Butyl/concrete/ synthetic		Coarse organic debris (c.o.05m-10mm diameter)		10	
Stone blocks		Ooze (i.e. non-particulate)		40	
Sand		Sand (often stream-borne)			
Gravel	20	Gravel (often stream-borne)		10	
Pebbles and rocks	10	Pebbles and rocks		10	
Bed rock		Peat			
Peat		Boulders/Blocks			
Others		Other			
INFLOWS AND OUTFLOWS					
Does the pond have any seasonal or permanent inflows or outflows?					
Inflows	0	Outflows		0	
If yes, estimate their average width and depth. Where possible note the flow rate. Where this is difficult, estimate the flow					

category: 1= dry at time of survey, 2= 0-10cm/sec, 3= 11-50cm/sec, 4= 51-200cm/sec, 5= more than 200cm/sec				
Inflow or outflow	Water width (cm) (if wet)	Water depth (cm)	Flow rate (cm/sec)	Flow category
N/A	N/A	N/A	N/A	N/A
BANK TYPE AND NATURALNESS				
		Min	Max	Av
Bank angle to top of sediment only (over 1m from outer edge of pond) (°)		20	30	25
Bank angle to base of pond (i.e. below sediment, (over 1m) (°)		20	25	20
Water depth at edge (NB usually = 0cm) (cm)		0	0	0
Bank type	%		%	
Natural Earth	100	Wood		
Concrete		Stone		
Metal Piling		Rock		
Spoil		Other		
	%			
Bare ground on upper banks:	Less than 5	Reason for bare ground:		
Bare ground on drawdown area:	Less than 5	Reason for bare ground:		
POND MANAGEMENT				
Livestock grazing				
Is the pond grazed by livestock?				NO
If yes, which animals graze the pond?			Cattle	
			Horses	
			Sheep	
			Other	
% pond margin grazed by livestock	%	% of pond grazed by livestock?	%	
Rank the livestock grazing intensity for the pond as a whole				
1= very light or periodic, 2= light, 3= moderate, 4= heavy, 5= very heavy				
DUCK AND WILDFOWL GRAZING				
Is there evidence of duck or wildfowl?				NO
Rank the duck and other wildfowl grazing intensity for the pond as a whole:				
1= very light or periodic, 2= light, 3= moderate, 4= heavy, 5= very heavy				
Notes about which duck/ wildfowl graze the pond, and how many? Also, describe any evidence of nesting.				
Possible, due to nearby bird activity				

OTHER GRAZING			
Is the pond grazed by other animals (e.g. deer)? If yes, describe which animals and what % of the pond is grazed by other animals?			
FISH			
Are there fish present in the pond?			YES
If yes, rank the fish impact for the pond as a whole :			
1= very light or periodic, 2= light, 3= moderate, 4= heavy, 5= very heavy			1
If yes, describe the fish and approximate numbers if known:			
AMPHIBIANS			
Are amphibians present in the pond?		Unknown	
If yes, record the list of species and approximate abundance if known:			
No known			
POND AGE AND HISTORY 2			
Rank age of pond as 1= 1-10yrs, 2= 11-100yrs., 3= 101-1000yrs, 4= more than 1000yrs.			
2			
What is the likely origin of the pond?			
Not known			

AMENITY VALUE						
Is there a view of the pond from rights of way?					YES	
If yes, score each of the following on a five point scale (1= view almost obscured, 5= clearly visible)						
		Score (1-5)				
Footpath						
Bridle Path						
A Road						
B Road						
Minor Road						
Open Public access		3				
Other Public access		3				
Private track, path or other access		3				
Is the pond located in an area of open public access?						NO
FORMAL AMENITY USE						
Is there any evidence of formal amenity use?					YES	
If yes, please select 'yes' as appropriate:						
Fishing			(e.g. fishing platforms, pegs, swims, embankments)			
Shooting			(e.g. hides, blinds)			
Ornamental Fish			(e.g. Koi carp, goldfish)			
Ornamental wildfowl			(e.g. nesting boxes, feeders)			
Pond dipping			(e.g. dipping platforms, bird hides)			
Boating and other water sports			(e.g. boat/ boathouse)			
Model boating						
Other Bird watching						
WATER QUALITY						
Conductivity ($\mu\text{S cm}^{-1}$)					260	
Calcium (mg l^{-1})					27	
Alkalinity (m mol l^{-1})					100	
pH					6.85	
Temperature ($^{\circ}\text{C}$)					16.8	
Turbidity (1= clear, 2= moderately clear, 3= moderately turbid, 4= turbid)					2	
Secchi depth (cm)					35	
Water colour					clear	
Probable source of water colour						
SOURCES OF POLLUTION						
Is there any evidence of rubbish or other pollutants? (e.g. oils)						

If yes, estimate the % of the pond affected:		%	
Type of pollutants present:			
Rank individual pollutant sources on a scale of 1-5 (1= little polluted or affected, 5= very polluted):			
		Score (1-5)	
Agricultural/Farming land use quality			
Urban areas			
Road runoff quality		1	
Stream and other inflows			
Ducks		1	
Fish		1	
Stock			
Litter			
Other			
Give an overall rating of the extent to which the pond is likely to be polluted (from 0= not polluted to 10= as bad as it can get):			
Describe any mitigating factors (e.g. buffering, groundwater inflows):			
Photograph taken	Yes	Photograph Unique Reference ¹	040-B-153002-P1-060512
			040-p2-153002-P2-060512

- 10.4.9 Waterbody 040-PS3-159001 was a large pool, heavily shaded by trees in marginal areas, located in local nature reserve and surrounded mainly by scrub, deciduous woodland, paths and roads. It had a low macrophyte diversity, with only six species recorded, namely soft rush, bittersweet, creeping Jenny (*Lysimachia nummularia*), tufted forget-me-not (*Myosotis laxa*), great pond sedge and bulrush. It had a moderate invertebrate species diversity with 20 species recorded over two surveys, including the notable (conservation score 7) lesser water boatmen *Sigara striata* and (conservation score 5) *Callicorixa wollastoni* and *Sigara limitata*.

Table 6g: Survey Results for NPS on water body 040-PS3-159001

Unique Reference Code	040-PS3-159001		
Surveyor	NG and GE	Date	05 July 2013
8 Digit GPS Co-ordinates	SP 19946 86238	Survey duration	2.5hrs.
Weather conditions			
POND AREA			
Pond area (m²)	16,900	Water area (m²)	16,500
Max length (m)	210	Max width (m)	90
Marginal complexity	3 or 4	Rank the complexity of the margins on a scale of 1 to 10	
1= very simple i.e. circle, 2= 10% greater length of margin (i.e. square not circle), 4= length c. double bank length that pond would be if circle, 7= five times length of bank, 10= pool with impossibly convoluted margin and/or many islands			

SEASONAL WATER LEVEL FLUCTUATION AND PERMANENCE						
Drawdown height (cm)		i.e. the difference between maximum and current water levels				
Permanence	1 or 2	Pond dries: 1= never, 2= rarely, 3= sometimes, 4= annually				
If the pond dries, how much probably dries to a hard base?					0	%
If the pond dries, how much probably dries to soft sediment?					5	%
OVERHANGING TREES AND SHRUBS						
Pond overhung	25	%	Water overhung	20	%	
Total pond margin overhung	100	%	Water margin overhung	100	%	
SURROUNDING LAND USE						
Estimate the percentage of surrounding land use within the following zones.						
LAND-USE	Less than 5m	0-100m	Surface water catchment			
Deciduous trees and Woodland	90	60	50			
Coniferous trees and Woodland						
Scrub/Hedge	5		5			
Moor/Lowland Heath						
Bog		10	10			
Fen/Marsh						
Rank Vegetation						
Unimproved grassland		5	5			
Semi-improved grassland						
Improved grassland						
Arable						
Gardens and Parks						
Buildings and concrete						
Roads		5	5			
Paths and tracks			5			
rock, stone, gravel						

Ponds and lakes		20	20
Streams, ditches etc.			
Other			
Is the pond located in an area protected for nature conservation (e.g. reserve)?			YES
If so, what type? (e.g. SSSI)		Coleshill Pools SSSI	
SIZE OF SURFACEWATER CATCHMENT			
Size of surface water catchment (1-5)		4	
<p>5= very large, more than 100,000m² (more than 100m x 1000m); 4= large, 10,000m²-100,000m² (less than 100m x 1000m); 3= moderate, 1,000m²-10,000m² (less than 100m x 100m); 2= small, 100m²-1,000m² (less than 10 x 100m); 1= tiny, less than 100m² (=10 x 10m)</p>			

OTHER ADJACENT WETLANDS AND WATER BODIES					
Is the pond located on or near to a stream or river floodplain? Rank 0 - 3					0
Is the pond located in a traditionally watery or wetland area? Rank 0 - 3					2
How isolated is the water body? Rank 0 - 5					2
WATER SOURCE					
Estimate the importance of the following water sources					%
Groundwater/water table					30
Spring (less than 25m long)					0
Flood water					10
Runoff and near surface water					50
Stream or ditch					0
Flush					0
Direct precipitation					10
Others (Land drains etc.)					0
SEDIMENT AND WATER DEPTHS					
	Transect A (longest dimension)			Transect B (right angles to A)	
	A ₁	A ₂	A ₃	B ₁	B ₂
Water depths (cm)	80				
Silt depths (cm)	20				
Total depth (silt and water)(cm)	100				
GEOLOGY					
			Rock Type	Percentage (%)	
Predominant rock type in geology of pond					
Predominant rock type in geology of catchment					
Nature of pond base		Sediment			

Approximate % of the following:		Approximate % of the following:		
Clay/silt	50	Decomposing leaves and twigs	20	
Butyl/concrete/ synthetic		Coarse organic debris (c.o.05m-10mm diameter)	10	
Stone blocks		Ooze (i.e. non-particulate)	30	
Sand	10	Sand (often stream-borne)	10	
Gravel	10	Gravel (often stream-borne)	5	
Pebbles and rocks	10	Pebbles and rocks	5	
Bed rock		Peat	20	
Peat	20	Boulders/Blocks		
Others		Other		
INFLOWS AND OUTFLOWS				
Does the pond have any seasonal or permanent inflows or outflows?				
Inflows	Seasonal	Outflows	0	
If yes, estimate their average width and depth. Where possible note the flow rate. Where this is difficult, estimate the flow category: 1= dry at time of survey, 2= 0-10cm/sec, 3= 11-50cm/sec, 4= 51-200cm/sec, 5= more than 200cm/sec				
Inflow or outflow	Water width (cm) (if wet)	Water depth (cm)	Flow rate (cm/sec)	Flow category
Inflow (dry)				1
Outflow (dry)				1

BANK TYPE AND NATURALNESS					
		Min	Max	Av	
Bank angle to top of sediment only (over 1m from outer edge of pond) (°)		10	50	20	
Bank angle to base of pond (i.e. below sediment, (over 1m) (°)		15	15	15	
Water depth at edge (NB usually = ocm) (cm)		0	0	0	
Bank type	%		%		
Natural Earth	90	Wood	0		
Concrete	0	Stone	5		
Metal Piling	0	Rock	5		
Spoil		Other			
	%				
Bare ground on upper banks:	0	Reason for bare ground:			
Bare ground on drawdown area:	0	Reason for bare ground:			
POND MANAGEMENT					
Livestock grazing					
Is the pond grazed by livestock?				NO	
If yes, which animals graze the pond?			Cattle		
			Horses		
			Sheep		
			Other		
% pond margin grazed by livestock	100%	% of pond grazed by livestock?		10%	
Rank the livestock grazing intensity for the pond as a whole				5	
1= very light or periodic, 2= light, 3= moderate, 4= heavy, 5= very heavy					
DUCK AND WILDFOWL GRAZING					
Is there evidence of duck or wildfowl?			NO		
Rank the duck and other wildfowl grazing intensity for the pond as a whole:					
1= very light or periodic, 2= light, 3= moderate, 4= heavy, 5= very heavy					
Notes about which duck/ wildfowl graze the pond, and how many? Also, describe any evidence of nesting.					
Likely to be present - not observed					
OTHER GRAZING					
Is the pond grazed by other animals (e.g. deer)? If yes, describe which animals and what % of the pond is grazed by other animals?					
Not observed					

FISH		
Are there fish present in the pond?		YES
If yes, rank the fish impact for the pond as a whole :		3
1= very light or periodic, 2= light, 3= moderate, 4= heavy, 5= very heavy		
If yes, describe the fish and approximate numbers if known:		
Unknown, large carp observed.		
AMPHIBIANS		
Are amphibians present in the pond?	Unknown	
If yes, record the list of species and approximate abundance if known:		
Unknown		
POND AGE AND HISTORY		
2/3		
Rank age of pond as 1= 1-10yrs, 2= 11-100yrs., 3= 101-1000yrs, 4= more than 1000yrs.		
What is the likely origin of the pond?		

AMENITY VALUE				
Is there a view of the pond from rights of way?				NO
If yes, score each of the following on a five point scale (1= view almost obscured, 5= clearly visible)				
		Score (1-5)		
Footpath				
Bridle Path				
A Road				
B Road				
Minor Road				
Open Public access				
Other Public access				
Private track, path or other access				
Is the pond located in an area of open public access?				
FORMAL AMENITY USE				
Is there any evidence of formal amenity use?				NO
If yes, please select 'yes' as appropriate:				
Fishing		(e.g. fishing platforms, pegs, swims, embankments)		
Shooting		(e.g. hides, blinds)		
Ornamental Fish		(e.g. Koi carp, goldfish)		
Ornamental wildfowl		(e.g. nesting boxes, feeders)		
Pond dipping		(e.g. dipping platforms, bird hides)		
Boating and other water sports		(e.g. boat/ boathouse)		
Model boating				
Other				
WATER QUALITY				
Conductivity ($\mu\text{S cm}^{-1}$)			206.7	
Calcium (mg l^{-1})				
Alkalinity (m mol^{-1})				
pH			7.27	
Temperature ($^{\circ}\text{C}$)			22.3	
Turbidity (1= clear, 2= moderately clear, 3= moderately turbid, 4= turbid)			4	
Secchi depth (cm)			3.3	
Water colour			brown	
Probable source of water colour				
Substrate and presence of solutes				
SOURCES OF POLLUTION				
Is there any evidence of rubbish or other pollutants? (e.g. oils)				
No				
If yes, estimate the % of the pond affected:			%	
Type of pollutants present:				

Rank individual pollutant sources on a scale of 1-5 (1= little polluted or affected, 5= very polluted):			
			Score (1-5)
Agricultural/Farming land use quality			0
Urban areas			0
Road runoff quality			2 or 3
Stream and other inflows			0
Ducks			0
Fish			1
Stock			0
Litter			0
Other			0
Give an overall rating of the extent to which the pond is likely to be polluted (from 0= not polluted to 10= as bad as it can get):			4
Describe any mitigating factors (e.g. buffering, groundwater inflows):			
Photograph taken	Yes	Photograph Unique Reference ¹	040-PS3-159001-P2-110713 040-PS3-159001-P1-090513
Pond heavily shaded by willows at margins, with dead Juncus shoots in the open area of pond. Water very turbid, therefore no submerged vegetation. Pond located within wet birch woodland.			

- 10.4.10 Water body 040-PS3-165001 was a system of connected ponds and ditches, with a relatively diverse macrophyte community of emergent and floating leaved plants including white water-cress (*Rorippa nasturtium-aquaticum*), lesser duckweed (*Lemna minor*), reed sweet-grass (*Glyceria maxima*), lesser spearwort (*Ranunculus flammula*), dock species and yellow iris, but with substantial water fern and duckweed cover. It had a moderate to high invertebrate species diversity with 23 species recorded, including the notable diving beetle *Ilybius guttiger*.

Table 70: Survey Results for NPS on water body 040-PS3-165001

Unique Reference Code	040-PS3-165001		
Surveyor	NG and GE	Date	15 August2012 08 May2013 10 July 2013
8 Digit GPS Co-ordinates	SP 1483 9040	Survey duration	1.5 hrs.
Weather conditions	overcast with showers		
POND AREA			
Pond area (m²)	500	Water area (m²)	450
Max length (m)		Max width (m)	
Marginal complexity	10	Rank the complexity of the margins on a scale of 1 to 10	
1= very simple i.e. circle, 2= 10% greater length of margin (i.e. square not circle), 4= length c. double bank length that pond would be if circle, 7= five times length of bank, 10= pool with impossibly convoluted margin and/or many islands			

SEASONAL WATER LEVEL FLUCTUATION AND PERMANENCE					
Drawdown height (cm)	10 to 15	i.e. the difference between maximum and current water levels			
Permanence	2	Pond dries: 1= never, 2= rarely, 3= sometimes, 4= annually			
If the pond dries, how much probably dries to a hard base?				2	%
If the pond dries, how much probably dries to soft sediment?				2	%
OVERHANGING TREES AND SHRUBS					
Pond overhung	30	%	Water overhung	50	%
Total pond margin overhung	Less than 40	%	Water margin overhung	Less than 40	%
SURROUNDING LAND USE					
Estimate the percentage of surrounding land use within the following zones.					
LAND-USE	Less than 5m	0-100m	Surface water catchment		
Deciduous trees and Woodland	40	25	25		
Coniferous trees and Woodland					
Scrub/Hedge	30	20	20		
Moor/Lowland Heath					
Bog					
Fen/Marsh					
Rank Vegetation					
Unimproved grassland	30	50	50		
Semi-improved grassland					
Improved grassland					
Arable					
Gardens and Parks					
Buildings and concrete					
Roads					
Paths and tracks					
rock, stone, gravel					
Ponds and lakes					

Streams, ditches etc.		5	5
Other			
Is the pond located in an area protected for nature conservation (e.g. reserve)?			YES
If so, what type? (e.g. SSSI)		Park Hall SINC	
SIZE OF SURFACEWATER CATCHMENT			
Size of surface water catchment (1-5)			
5= very large, more than 100,000m ² (more than 100m x 1000m); 4= large, 10,000m ² -100,000m ² (less than 100m x 1000m); 3= moderate, 1,000m ² -10,000m ² (less than 100m x 100m); 2= small, 100m ² -1,000m ² (less than 10 x 100m); 1= tiny, less than 100m ² (=10 x 10m)			

OTHER ADJACENT WETLANDS AND WATER BODIES					
Is the pond located on or near to a stream or river floodplain? Rank 0 - 3					
Is the pond located in a traditionally watery or wetland area? Rank 0 - 3					
How isolated is the water body? Rank 0 - 5					
WATER SOURCE					
Estimate the importance of the following water sources					%
Groundwater/water table					
Spring (less than 25m long)					
Flood water					20
Runoff and near surface water					50
Stream or ditch					
Flush					
Direct precipitation					30
Others (Land drains etc.)					
SEDIMENT AND WATER DEPTHS					
	Transect A (longest dimension)			Transect B (right angles to A)	
	A ₁	A ₂	A ₃	B ₁	B ₂
Water depths (cm)	40	80	30	50	20
Silt depths (cm)	35	25	30	30	30
Total depth (silt and water)(cm)	75	105	60	80	50
GEOLOGY					
			Rock Type	Percentage (%)	
Predominant rock type in geology of pond					
Predominant rock type in geology of catchment					
Nature of pond base		Sediment			
Approximate % of the following:		Approximate % of the following:			
Clay/silt	80	Decomposing leaves and twigs			10
Butyl/concrete/ synthetic	0	Coarse organic debris (c.o.05m-10mm diameter)			30
Stone blocks	0	Ooze (i.e. non-particulate)			40
Sand	5	Sand (often stream-borne)			10
Gravel	5	Gravel (often stream-borne)			5
Pebbles and rocks	10	Pebbles and rocks			5
Bed rock	0	Peat			0
Peat	0	Boulders/Blocks			0
Others		Other			
INFLOWS AND OUTFLOWS					
Does the pond have any seasonal or permanent inflows or outflows?					

Inflows	0	Outflows	0
If yes, estimate their average width and depth. Where possible note the flow rate. Where this is difficult, estimate the flow category: 1= dry at time of survey, 2= 0-10cm/sec, 3= 11-50cm/sec, 4= 51-200cm/sec, 5= more than 200cm/sec			
Inflow or outflow	Water width (cm) (if wet)	Water depth (cm)	Flow rate (cm/sec)
BANK TYPE AND NATURALNESS			
	Min	Max	Av
Bank angle to top of sediment only (over 1m from outer edge of pond) (°)	40	80	50
Bank angle to base of pond (i.e. below sediment, (over 1m) (°)	40	80	50
Water depth at edge (NB usually = 0cm) (cm)			
Bank type	%		%
Natural Earth	100	Wood	
Concrete		Stone	
Metal Piling		Rock	
Spoil		Other	
	%		
Bare ground on upper banks:	0	Reason for bare ground:	
Bare ground on drawdown area:	0	Reason for bare ground:	
POND MANAGEMENT			
Livestock grazing			
Is the pond grazed by livestock?			YES
If yes, which animals graze the pond?	Cattle	Yes	
	Horses		
	Sheep		
	Other		
% pond margin grazed by livestock	50%	% of pond grazed by livestock?	20%
Rank the livestock grazing intensity for the pond as a whole			2
1= very light or periodic, 2= light, 3= moderate, 4= heavy, 5= very heavy			
DUCK AND WILDFOWL GRAZING			
Is there evidence of duck or wildfowl?			NO
Rank the duck and other wildfowl grazing intensity for the pond as a whole:			
1= very light or periodic, 2= light, 3= moderate, 4= heavy, 5= very heavy			
Notes about which duck/ wildfowl graze the pond, and how many? Also, describe any evidence of nesting.			
None observed			

OTHER GRAZING			
Is the pond grazed by other animals (e.g. deer)? If yes, describe which animals and what % of the pond is grazed by other animals?			
Not observed			
FISH			
Are there fish present in the pond?		Unknown but likely	
If yes, rank the fish impact for the pond as a whole :			
1= very light or periodic, 2= light, 3= moderate, 4= heavy, 5= very heavy			
If yes, describe the fish and approximate numbers if known:			
Unknown, but likely			
AMPHIBIANS			
Are amphibians present in the pond?		Unknown	
If yes, record the list of species and approximate abundance if known:			
Unknown			
POND AGE AND HISTORY			
Rank age of pond as 1= 1-10yrs, 2= 11-100yrs., 3= 101-1000yrs, 4= more than 1000 yrs.			
2			
What is the likely origin of the pond?			
River Tame SLINC			
AMENITY VALUE			
Is there a view of the pond from rights of way?			NO
If yes, score each of the following on a five point scale (1= view almost obscured, 5= clearly visible)			
		Score (1-5)	

Footpath			
Bridle Path			
A Road			
B Road			
Minor Road			
Open Public access			
Other Public access			
Private track, path or other access			
Is the pond located in an area of open public access?			
FORMAL AMENITY USE			
Is there any evidence of formal amenity use?			NO
If yes, please select 'yes' as appropriate:			
Fishing		(e.g. fishing platforms, pegs, swims, embankments)	
Shooting		(e.g. hides, blinds)	
Ornamental Fish		(e.g. Koi carp, goldfish)	
Ornamental wildfowl		(e.g. nesting boxes, feeders)	
Pond dipping		(e.g. dipping platforms, bird hides)	
Boating and other water sports		(e.g. boat/ boathouse)	
Model boating			
Other			
WATER QUALITY			
Conductivity ($\mu\text{S cm}^{-1}$)	1072		
Calcium (mg l^{-1})	52.8		
Alkalinity (m mol^{-1})	145		
pH	7.01		
Temperature ($^{\circ}\text{C}$)	18.2		
Turbidity (1= clear, 2= moderately clear, 3= moderately turbid, 4= turbid)	3		
Secchi depth (cm)	15		
Water colour	clear/brown		
Probable source of water colour			
SOURCES OF POLLUTION			
Is there any evidence of rubbish or other pollutants? (e.g. oils)			
No			
If yes, estimate the % of the pond affected:	%		
Type of pollutants present:			
Rank individual pollutant sources on a scale of 1-5 (1= little polluted or affected, 5= very polluted):			
	Score (1-5)		

Agricultural/Farming land use quality		0	
Urban areas		0	
Road runoff quality		0	
Stream and other inflows		0	
Ducks		0	
Fish		0	
Stock		0	
Litter		0	
Other		River Tame SLINC direct source	
Give an overall rating of the extent to which the pond is likely to be polluted (from 0= not polluted to 10= as bad as it can get):			
Describe any mitigating factors (e.g. buffering, groundwater inflows):			
Photograph taken	Yes	Photograph Unique Reference ¹	040-PS-165001-P1-150812 040-PS-165001-P1-150812+P3 040-PS3-165001-P3080513

- 10.4.11 Water body 040-PS-165002 had high plant diversity, but with substantial Azolla cover. Other plant species recorded include *Alisma plantago-aquatica*, *Epilobium hirsutum*, *Glyceria fluitans*, *Glyceria maxim*, *Juncus articulatus*, *Lycopus europaeus*, *Rorippa amphibian*, *Typha latifolia*, *Carex curta*, *Rumex* sp., *Iris pseudacorus*, *Persicaria hydropiper*, *Azolla filiculoides* and *Sparganium emersum*. The water body had a high invertebrate species diversity with 29 species recorded over 3 surveys, including the local (conservation score 5) snail (*Anisus leucostoma*), diving beetle (*Ilybius quadriguttatus*) and the regionally notable (conservation score 6) lesser water boatman (*Hesperocorixa muesta*).

Table 71: Survey Results for NPS on water body 040-PS3-165002

Unique Reference Code	040-PS3-165002		
Surveyor	NG and GE	Date	15 August2012 08 May2013 10 July2013
8 Digit GPS Co-ordinates	SP 15925 90848	Survey duration	1 hr.
Weather conditions			
POND AREA			
Pond area (m²)	200	Water area (m²)	800
Max length (m)	50	Max width (m)	18
Marginal complexity		Rank the complexity of the margins on a scale of 1 to 10	
1= very simple i.e. circle, 2= 10% greater length of margin (i.e. square not circle), 4= length c. double bank length that pond would be if circle, 7= five times length of bank, 10= pool with impossibly convoluted margin and/or many islands			

SEASONAL WATER LEVEL FLUCTUATION AND PERMANENCE					
Drawdown height (cm)	30	i.e. the difference between maximum and current water levels			
Permanence	1	Pond dries: 1= never, 2= rarely, 3= sometimes, 4= annually			
If the pond dries, how much probably dries to a hard base?				0	%
If the pond dries, how much probably dries to soft sediment?				20	%
OVERHANGING TREES AND SHRUBS					
Pond overhung	20	%	Water overhung	20	%
Total pond margin overhung	35	%	Water margin overhung	35	%
SURROUNDING LAND USE					
Estimate the percentage of surrounding land use within the following zones.					
LAND-USE	Less than 5m	0-100m	Surface water catchment		
Deciduous trees and Woodland	20	20	15		
Coniferous trees and Woodland	0	0	0		
Scrub/Hedge	10	10	15		
Moor/Lowland Heath	0	0	0		
Bog	5	10	5		
Fen/Marsh	0	0	0		
Rank Vegetation	0	0	0		
Unimproved grassland	65	60	65		
Semi-improved grassland	0	0	0		
Improved grassland	0	0	0		
Arable	0	0	0		
Gardens and Parks	0	0	0		
Buildings and concrete	0	0	0		
Roads	0	0	0		
Paths and tracks	0	0	0		
rock, stone, gravel	0	0	0		

Ponds and lakes	o	o	o
Streams, ditches etc.	o	o	o
Other	o	o	o
Is the pond located in an area protected for nature conservation (e.g. reserve)?			YES
If so, what type? (e.g. SSSI)		Nature Reserve	
SIZE OF SURFACEWATER CATCHMENT			
Size of surface water catchment (1-5)			
5= very large, more than 100,000m ² (more than 100m x 1000m); 4= large, 10,000m ² -100,000m ² (less than 100m x 1000m); 3= moderate, 1,000m ² -10,000m ² (less than 100m x 100m); 2= small, 100m ² -1,000m ² (less than 10 x 100m); 1= tiny, less than 100m ² (=10 x 10m)			

OTHER ADJACENT WETLANDS AND WATER BODIES					
Is the pond located on or near to a stream or river floodplain? Rank 0 - 3					2
Is the pond located in a traditionally watery or wetland area? Rank 0 - 3					2
How isolated is the water body? Rank 0 - 5					1
WATER SOURCE					
Estimate the importance of the following water sources					%
Groundwater/water table					0
Spring (less than 25m long)					0
Flood water					30
Runoff and near surface water					60
Stream or ditch					0
Flush					0
Direct precipitation					10
Others (Land drains etc.)					0
SEDIMENT AND WATER DEPTHS					
	Transect A (longest dimension)			Transect B (right angles to A)	
	A ₁	A ₂	A ₃	B ₁	B ₂
Water depths (cm)	60	80	70		
Silt depths (cm)	5	15	5		
Total depth (silt and water)(cm)	65	95	75		
GEOLOGY					
			Rock Type	Percentage (%)	
Predominant rock type in geology of pond					
Predominant rock type in geology of catchment					
Nature of pond base		Sediment			
Approximate % of the following:		Approximate % of the following:			
Clay/silt	85	Decomposing leaves and twigs			
Butyl/concrete/ synthetic	0	Coarse organic debris (c.o.05m-10mm diameter)			
Stone blocks	0	Ooze (i.e. non-particulate)			
Sand	0	Sand (often stream-borne)			
Gravel	10	Gravel (often stream-borne)			
Pebbles and rocks	5	Pebbles and rocks			
Bed rock	0	Peat			

Peat	0	Boulders/Blocks	
Others	0	Other	
INFLOWS AND OUTFLOWS			
Does the pond have any seasonal or permanent inflows or outflows? Tick those appropriate			
Inflows	0	Outflows	0
If yes, estimate their average width and depth. Where possible note the flow rate. Where this is difficult, estimate the flow category: 1= dry at time of survey, 2= 0-10cm/sec, 3= 11-50cm/sec, 4= 51-200cm/sec, 5= more than 200cm/sec			
Inflow or outflow	Water width (cm) (if wet)	Water depth (cm)	Flow rate (cm/sec)
BANK TYPE AND NATURALNESS			
	Min	Max	Av
Bank angle to top of sediment only (over 1m from outer edge of pond) (°)	5	15	10
Bank angle to base of pond (i.e. below sediment, (over 1m) (°)	5	15	10
Water depth at edge (NB usually = 0cm) (cm)	0	0	0
Bank type	%		%
Natural Earth	100	Wood	
Concrete		Stone	
Metal Piling		Rock	
Spoil		Other	
	%		
Bare ground on upper banks:	0	Reason for bare ground:	N/A
Bare ground on drawdown area:	0	Reason for bare ground:	N/A
POND MANAGEMENT			
Livestock grazing			
Is the pond grazed by livestock?			YES
If yes, which animals graze the pond?	Cattle	Yes	
	Horses		
	Sheep		
	Other		
% pond margin grazed by livestock	50%	% of pond grazed by livestock?	10%
Rank the livestock grazing intensity for the pond as a whole			2
1= very light or periodic, 2= light, 3= moderate, 4= heavy, 5= very heavy			

DUCK AND WILDFOWL GRAZING			
Is there evidence of duck or wildfowl?			NO
Rank the duck and other wildfowl grazing intensity for the pond as a whole: 1= very light or periodic, 2= light, 3= moderate, 4= heavy, 5= very heavy			
Notes about which duck/ wildfowl graze the pond, and how many? Also, describe any evidence of nesting.			
None observed			
OTHER GRAZING			
Is the pond grazed by other animals (e.g. deer)? If yes, describe which animals and what % of the pond is grazed by other animals?			
Not observed			
FISH			
Are there fish present in the pond?		unknown	
If yes, rank the fish impact for the pond as a whole :			
1= very light or periodic, 2= light, 3= moderate, 4= heavy, 5= very heavy			
If yes, describe the fish and approximate numbers if known:			
Unknown, but likely			
AMPHIBIANS			
Are amphibians present in the pond?			YES
If yes, record the list of species and approximate abundance if known:			
Unknown			
POND AGE AND HISTORY			
Rank age of pond as 1= 1-10yrs, 2= 11-100yrs., 3= 101-1000yrs, 4= more than 1000yrs.			
2			
What is the likely origin of the pond?			
Unknown			

AMENITY VALUE				
Is there a view of the pond from rights of way?				NO
If yes, score each of the following on a five point scale (1= view almost obscured, 5= clearly visible)				
		Score (1-5)		
Footpath				
Bridle Path				
A Road				
B Road				
Minor Road				
Open Public access				
Other Public access				
Private track, path or other access				
Is the pond located in an area of open public access?				
FORMAL AMENITY USE				
Is there any evidence of formal amenity use?				NO
If yes, please select 'yes' as appropriate:				
Fishing		(e.g. fishing platforms, pegs, swims, embankments)		
Shooting		(e.g. hides, blinds)		
Ornamental Fish		(e.g. Koi carp, goldfish)		
Ornamental wildfowl		(e.g. nesting boxes, feeders)		
Pond dipping		(e.g. dipping platforms, bird hides)		
Boating and other water sports		(e.g. boat/ boathouse)		
Model boating				
Other				
WATER QUALITY				
Conductivity ($\mu\text{S cm}^{-1}$)			301	
Calcium (mg l^{-1})			23.6	
Alkalinity (m mol^{-1})			100	
pH			6.78	
Temperature ($^{\circ}\text{C}$)			18.1	
Turbidity (1= clear, 2= moderately clear, 3= moderately turbid, 4= turbid)			1	
Secchi depth (cm)			25	
Water colour			clear	
Probable source of water colour				
N/A				
SOURCES OF POLLUTION				
Is there any evidence of rubbish or other pollutants? (e.g. oils)				
No				

If yes, estimate the % of the pond affected:		%	
Type of pollutants present:			
Rank individual pollutant sources on a scale of 1-5 (1= little polluted or affected, 5= very polluted):			
		Score (1-5)	
Agricultural/Farming land use quality		0	
Urban areas		0	
Road runoff quality		0	
Stream and other inflows		2	
Ducks		0	
Fish		0	
Stock		0	
Litter		0	
Other		River Tame SLINC direct source	
Give an overall rating of the extent to which the pond is likely to be polluted (from 0= not polluted to 10= as bad as it can get):			
Describe any mitigating factors (e.g. buffering, groundwater inflows):			
Photograph taken	Yes	Photograph Unique Reference ¹	040-PS-165002-P1-150812 040-PS-165002-P2-150812
Clearly the most diverse pond on site, in terms of aquatic flora.			

Desk study

- 10.4.12 No desk study records relating to ponds and canals surveyed were obtained.

Discussion

- 10.4.13 The pond and canal surveys have identified ponds with high nature conservation interest were identified in all areas, with the exception of the Washwood Heath to Curzon Street area (CFA26).

Balsall Common and Hampton-in-Arden area (CFA23)

- 10.4.14 Several ponds of nature conservation interest were identified within this area. These included:
- the pond south-west of Beechwood Farm (040-PS3-148001), which was of note, owing to its invertebrate community and relatively high macrophyte diversity, including the non-native *Elodea nutalli* (Schedule 9);
 - the ponds at Marsh Lane Nature Reserve (040-PS3-153001 and 040-PS3-153002), which were characterised by a relatively high diversity of aquatic

plants (notably 040-PS3-153002) and invertebrates, and presence of notable species (discussed within the aquatic invertebrate section);

- a small pond at Moat House Farm (040-PS1-149003), with high invertebrate diversity;
- the pond at the island north of Bradnock's Marsh Lane, (040-PS2-152001), which is of importance owing to its high numbers of aquatic invertebrate species and the presence of other notable species including the diving beetle (*Hygrotus confluens*); and
- a pond within the land west of the A452 Kenilworth Road and north of the B4102 Meriden Road (040-PS1-154002), characterised by very high invertebrate diversity.

Birmingham Interchange and Chelmsley Wood area (CFA24)

10.4.15 The small, vegetated pond (040-PS2-157007) on the land west of A446 Stonebridge Road and north of Middle Bickenhill Lane was of note for the high number of invertebrate species it supports, including the presence of other notable species.

10.4.16 Also, several ponds within the land west of Denbigh Spinney LWS area have been highlighted as being of importance by the PSYM analysis:

- pond 8 (040-PS2-157005);
- pond 5 (040-PS2-157007); and
- pond 4 (040-PS2-157008).

Castle Bromwich and Bromford area (CFA25)

10.4.17 Important ponds were identified within the Castle Bromwich and Bromford area, located within Park Hall SINC.

10.4.18 The most recently established ponds and ditches, which supported only low levels of vegetation when the surveys were undertaken, were most diverse in terms of aquatic invertebrates. Older ponds were generally characterised by higher floral diversity, although the presence of water fern (*Azolla filiculoides*) and lesser duckweed in many of the ponds appears to limit the diversity of macrophytes. The ponds identified were:

- hill pond (040-PS3-165002), which was moderately diverse in terms of its flora (and highly diverse in terms of macro-invertebrate fauna), despite the presence of *Azolla*, recorded during the site survey;
- new ditch 2 (040-PS2-166007);
- kidney pond (040-PS2-167002);
- new pond 2 (040-PS2-166004);
- ephemeral pool (040-PS2-166006); and
- ephemeral pond under Pylon (040-PS2-166008).

Washwood Heath to Curzon Street area (CFA26)

- 10.4.19 Two canals were surveyed within this area; these comprised the Digbeth Branch Canal SLINC and the Grand Union Canal SLINC. These water bodies differed in terms of their macro-invertebrate fauna. The Grand Union Canal SLINC supported only a low diversity of invertebrates whereas the Digbeth Branch Canal SLINC supported a diverse macro-invertebrate community, including the pollution sensitive caddis larvae.

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